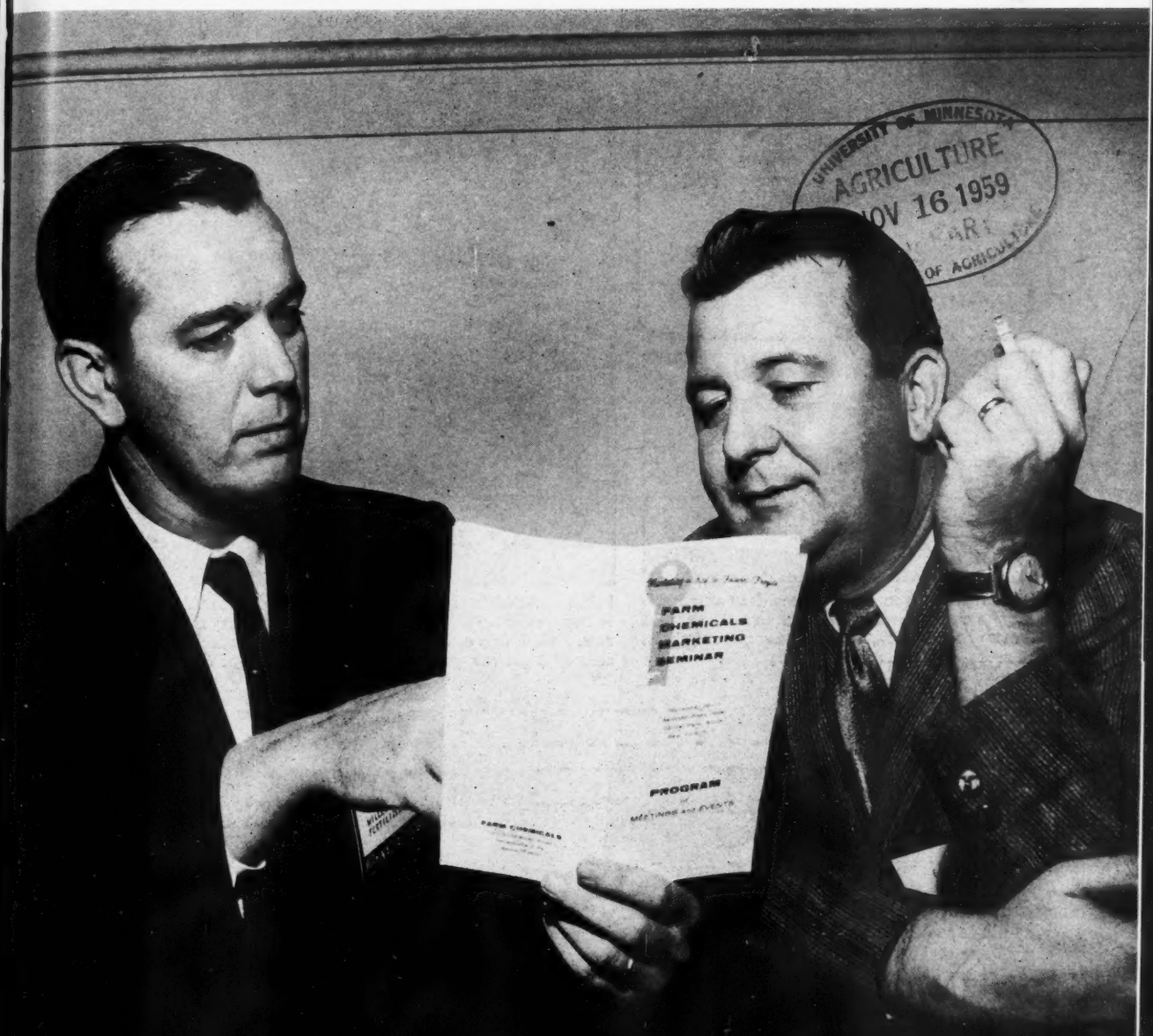
November Volume 122 No. 11 50 Cents
Pioneer Journal of the Industry

FARM CHEMICALS

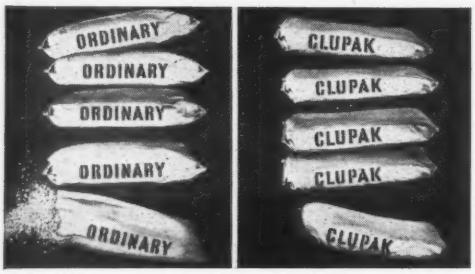


Marketing Semi[illegible] for
he Farm Chemi[illegible]
ndustry November 16-17

YOUR CLUE TO BETTER MULTIWALL SACKS... EXTENSIBLE CLUPAK PAPER

WIDE VARIETY of products now being shipped in CLUPAK paper multiwall bags includes:

Aluminum sulphate	Perlite
Ammonium nitrate	Pigments
Calcium carbonate	Plant foods
Calcium chlorate	Plaster of Paris
Carbon black	Powdered insecticides
Cement	Pulverized rock
Clays	Polyethylene crystals
Cotton seed meal	Salt
Dehydrated alfalfa	Sand
Feed	Seed
Flour	Soybeans and meal
Fertilizer	Steric acid
Frits	Sugar
Hydrated lime	Sulphate of potash
Meal	Talc
Oyster shells	



DROP TEST comparison demonstrates CLUPAK paper's ability to resist shock. Multiwall sack made with CLUPAK paper (right), survives many more test falls than sack (left) made with ordinary kraft.

ROUGH HANDLING in shipping emphasizes CLUPAK kraft's toughness, ability to stand up where failure often occurs with ordinary multiwalls. Even when new, lighter bag constructions are used, the CLUPAK trademark is your assurance the bag paper meets the most rigid of shipping requirements.

DISCOVERY GIVES PAPER NEW "*TOUGHNESS*" ...MAKES IT ABSORB SHOCKS INSTEAD OF TEARING

BETTER PERFORMANCE, LOWER COST! CLUPAK Extensible Paper opens a new era in paper . . . makes it virtually a new material, with unlimited applications. For CLUPAK paper has built-in *stretch* or extensibility which lets it absorb the shocks and strains that cause ordinary paper to rip, tear and puncture. The result is a new dimension in paper — *toughness*. In multiwall sacks, CLUPAK paper toughness delivers far better performance... often at lower cost, by permitting fewer multiwall plies and a net saving in total basis weight. And CLUPAK paper *flexibility* can mean additional advantages — faster filling, easier handling and stacking.

BE SURE TO LOOK FOR THIS TRADEMARK

EXTENSIBLE
CLUPAK®*
PAPER

**Clupak, Inc.'s trademark for extensible paper manufactured under its authority.*

KEY FACTS FOR BUYERS

1 CLUPAK kraft is the same as ordinary kraft except that it is stronger, tougher and more flexible.

2 CLUPAK paper can be made in many basis weights and with varying degrees of stretch. Printability, surface friction, porosity and other properties can be controlled as with ordinary paper.

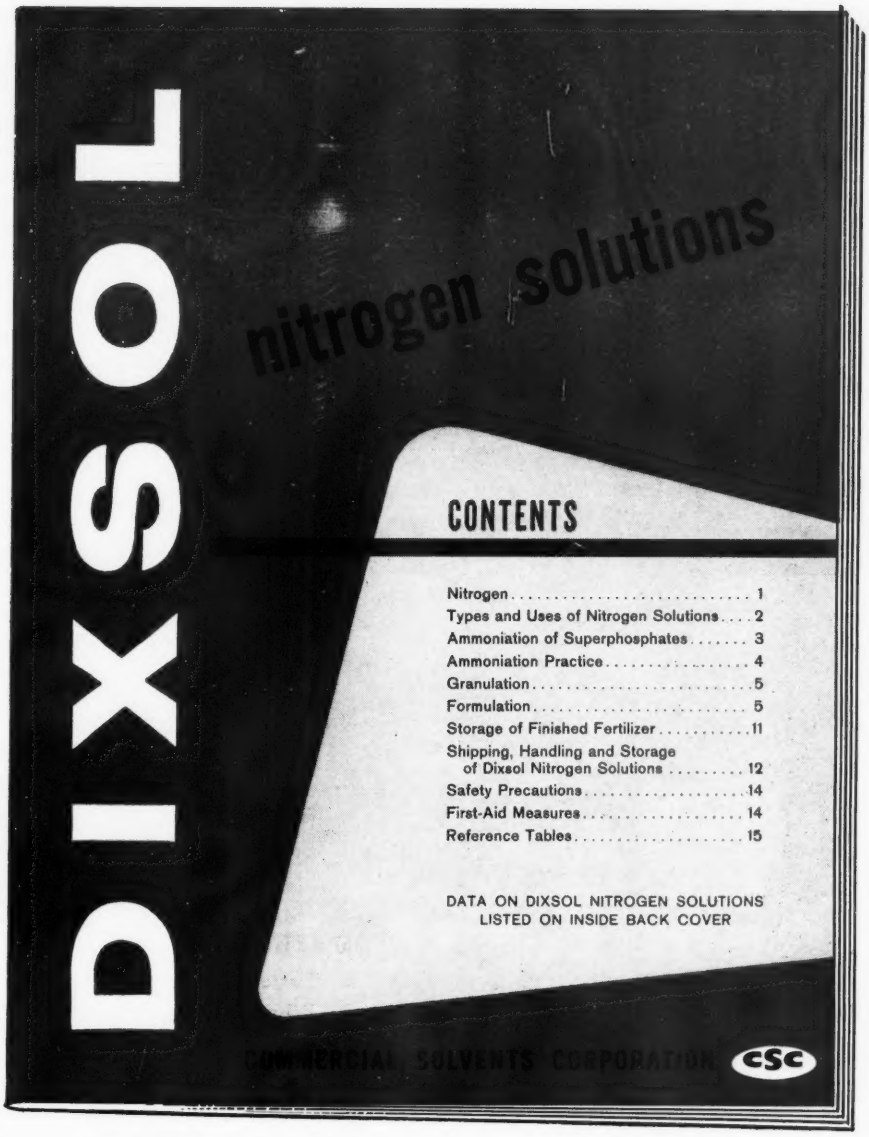
3 CLUPAK paper toughness and flexibility open up unlimited new uses for paper. Clupak, Inc. carries on continuous research and development work and results are made available to all licensees.

4 CLUPAK, INC. permits the use of its trademark only on paper which meets this company's rigid toughness requirements.

Clupak, Inc., 530 Fifth Avenue, New York 36, N. Y.

Buy CLUPAK paper and products made with CLUPAK paper from:

Albemarle Paper Mfg. Co.
Calcasieu Paper Co.
Canada Paper Co. (Canada)
Crown Zellerbach Corp.
Continental Can Company, Inc.
Dynas Aktiebolag (Sweden)
Hudson Pulp and Paper Corp.
International Paper Co.
St. Lawrence Corp., Ltd. (Canada)
St. Regis Paper Co.
Union Bag-Camp Paper Corp.
West Virginia Pulp and Paper Co.



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Here's a new and convenient guide that should be in the hands of every fertilizer production man. As you can see from the contents listed on the cover, it's packed with information and data. And it's designed to assist you in your production planning and problems. If you have not already received a copy, write today.

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MEMBER BUSINESS PUBLICATIONS AUDIT

The national business magazine for the fertilizer and pesticide industries, FARM CHEMICALS, serves primarily those persons responsible for management, marketing and production. It has a qualified circulation for selected executive and supervisory persons within specified segments of these industries, as well as in certain closely allied fields. Subscription rates to all others are: in the U.S., its possessions, Canada, Cuba and Panama: $6.00; in other countries: $7.50. Single copy 50 cents. Established in 1894 as *The American Fertilizer*.

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FARM CHEMICALS

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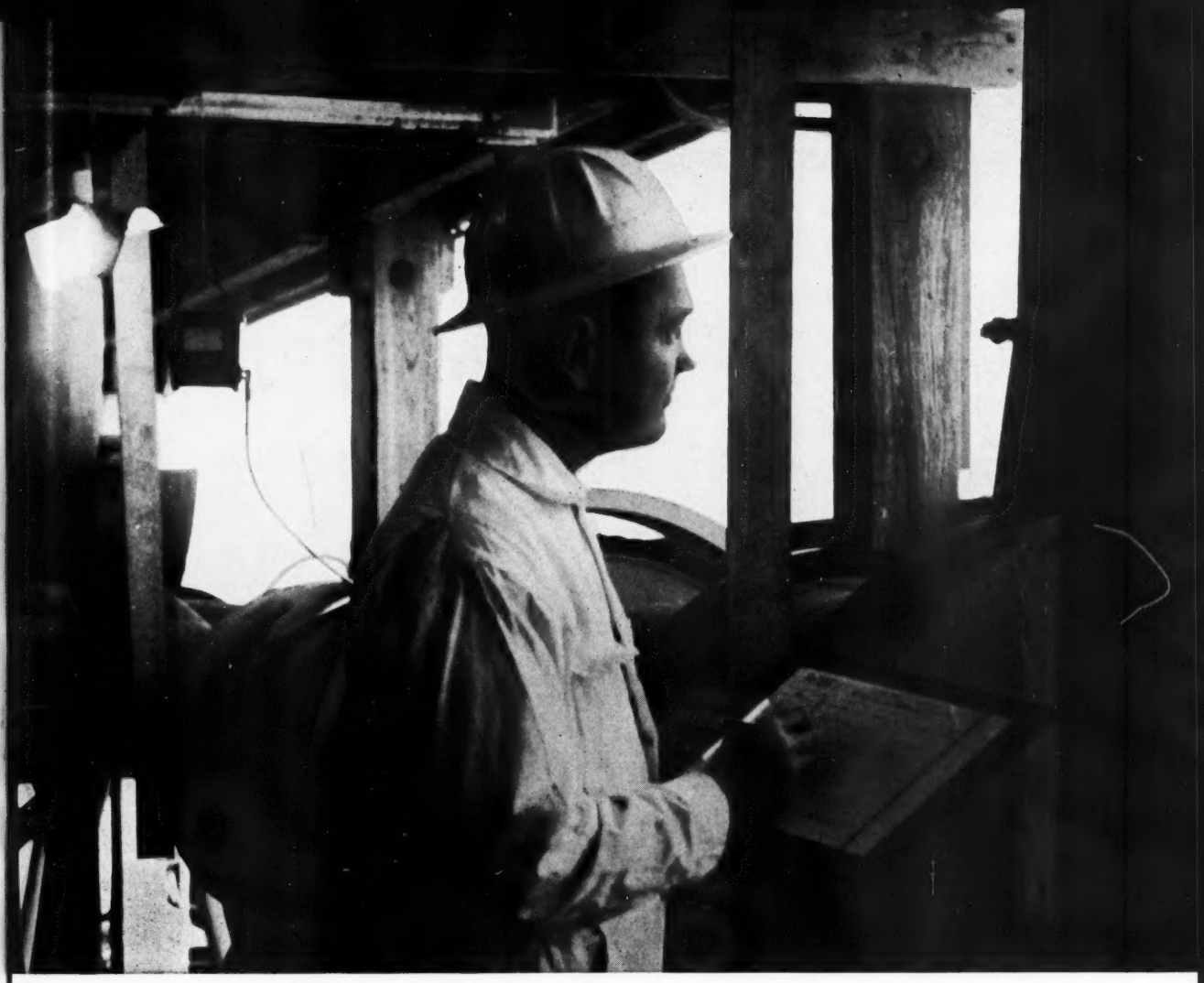
THE COVER PICTURE

When this month's FARM CHEMICALS Marketing Seminar (FCMS) convenes at the Barbizon-Plaza Hotel in New York City, Roger W. Cohill (left) of Miller Chemical & Fertilizer Corporation, Baltimore, will be moderator. On this month's cover photo he is shown discussing the program with a Seminar "prospect"—Edward M. Billings, sales manager, Inland Chemical Company, Fort Wayne, Indiana. The picture was taken at the National Agricultural Chemical Association's convention in French Lick, Indiana. Cohill is vice president in charge of sales for Miller, which manufactures and distributes both fertilizer and pesticides.



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WONDERWALL, West Virginia's new multiwall bag made with Kraftsman Clupak paper, is inspected by industry leader Robert S. Gerstell, President, Alpha Portland Cement Company, Easton, Pa. "This isn't the first time we've introduced revolutionary advances for the sake of better operations in our plants . . . and for our ultimate customers," Mr. Gerstell states.

...ALPHA CEMENT changed to multiwalls of West Virginia's Clupak* Paper

When the new tougher Kraftsman Clupak paper was being introduced by West Virginia Pulp and Paper Co., the Alpha Portland Cement Co., Easton, Pa., major producer of Portland and mortar cements, did its own testing.

This was only natural for a leading company in the industry—with eight plants in the East, Midwest and South. Alpha's president, Robert S. Gerstell, foresaw the tremendous possibilities of Kraftsman Clupak paper, especially in terms of customer satisfaction and operating economy. With his guidance, Alpha was the first major cement company fully to realize the potentials of this new West Virginia paper!

Alpha's purchasing agent, James I. Maguire, directed the test program which compared Alpha's then current, natural kraft multiwalls with bags made of the new Kraftsman Clupak, the paper with built-in stretch.

Filling, handling and shipping were all examined. On every count, the new Kraftsman Clupak paper bag proved its superior toughness!

Construction of the natural kraft bags, to carry 94# of Portland cement, was 2/40, 2/50 totalling 180# paper basis weight. The new Kraftsman Clupak bags were 1/50, 1/50, 1/50 totalling 150# paper basis weight. Savings on the paper basis weight reduction of 30# amounted to $2.75 per M bags.

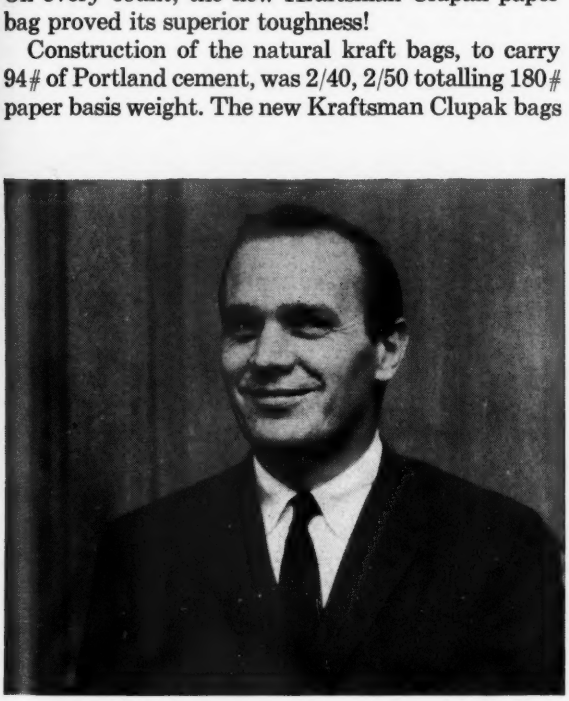
But more important—bag breakage in shipments of both Portland and mortar cement has become negligible! And complaints from supply dealers have been reduced to a minimum.

Today, virtually all multiwalls used by Alpha, from whatever supplier, are made of Kraftsman Clupak paper. And naturally, Alpha is using West Virginia's own bag, called WONDERWALL.

If you pack fertilizer, feed, cement, flour, chemicals or like products, see how you can *cut costs* and satisfy customers *better* with WONDERWALL. Write Multiwall Bag Division, West Virginia Pulp and Paper Company, 230 Park Avenue, New York 17, N. Y.

West Virginia Pulp and Paper

**Clupak, Inc.'s trademark for extensible paper manufactured under its authority.*



TEST MASTER. James I. Maguire, purchasing agent of Alpha Portland Cement Company, says: "The success of bags made from Kraftsman Clupak paper, due to sheer toughness, was extraordinary from the start. They are not only tougher . . . they make possible realistic savings in bag costs."

WONDERWALL PROVING GROUND #1. Actual handling of WONDERWALLS and other bags made with Kraftsman Clupak paper—in comparison with the old, natural kraft multiwalls—proves the superiority of Kraftsman Clupak paper. No problems with filling, opening, stacking or shipping.

LETTERS

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FROM A PVA USER

Nitro, W. Va.

We notice in your article by Peter C. Crolius on polyvinyl alcohol packaging that he suggested the possibility of insecticides and fungicides being packaged in this material during the coming season.

We would like to inform you that we have been packaging Thiram in water soluble bags made of polyvinyl alcohol for the last three years and that we have been also packaging sodium fluoroacetate in water soluble packages for the last two years. This material has been manufactured for us by the Monosol Corp. of Gary, Indiana, and has proved to be a very satisfactory package.

I am sure that many chemical manufacturers can profit by the use of this material.

Sincerely,
ELMER A. FIKE
President
ROBERTS CHEMICALS, INC.

"FCMS" DETAILS

Rutherford, N. J.

I have just finished your September, 1959, issue and am very much interested in your Marketing Seminar which will be held at the Barbizon-Plaza in New York.

Therefore, would appreciate your sending me advanced information regarding topics to be discussed and appropriate fees. Your cooperation in this matter is appreciated.

Very truly yours,
G. F. COSTON

Complete information on FARM CHEMICALS *Marketing Seminar appears on pages 19-21 of this issue—Ed.*

New York, N. Y.

If available, kindly forward to the above address six reprints of the article entitled "Bag Filling Machines" which appeared in the January, 1959 issue of your magazine. Also please invoice any charges involved to the above address.

Thank you for your kind cooperation.

Very truly yours,
L. S. HERZ
PHOSPHATE ROCK EXPORT CORP.

"HIDDEN PLUSSES"

Savannah, Ga.

Would it be possible to secure ten copies of article appearing in October entitled "The Hidden Plusses in Your Product" by Ted Pollock? If so, please forward, together with bill.

Yours very truly,
W. W. HARLEY
Vice President—Sales
SOUTHERN FERTILIZER & CHEMICAL CO.

CYANAMID ANNOUNCES SCHEDULE OF MEETINGS

The Agricultural Division of American Cyanamid Company, on October 17 announced its schedule of regional sales meetings.

Dates and locations:

Northeast region, Cherry Hill Inn, Haddonfield, N. J., Oct. 26–27. H. H. Phillips, regional manager;

Southeast region, Riviera Hotel, Atlanta, Ga., Oct. 29–30. C. W. Cook, regional manager;

Midwest region, The Wagon Wheel, Rockford, Ill., Nov. 5–6. John Howard, regional manager;

Southwest region, Sheraton Hotel, Dallas, Texas, Nov. 5–6. Ira Sturkie, regional manager; and

Western region, Hacienda Hotel, Fresno, Calif., Nov. 9–10. Hamilton Clark, regional manager.

UNEXCELLED CHEMICAL MOVES

Unexcelled Chemical Corp. has announced the move of its executive offices to 666 Fifth Ave., New York City 19. Telephone: CIrcle 7-3380.

WHAT'S DOING IN THE INDUSTRY

F C

W. R. GRACE & CO. SIGNS MANAGEMENT CONTRACT WITH PUERTO RICAN FIRM

W. R. Grace & Co. of New York and Gonzalez Chemical Industries, Inc. of Puerto Rico signed a contract today under which Grace will manage and operate the Gonzalez ammonia and ammonium sulfate plant located at Guanica, Puerto Rico.

The management contract is a first step in a contemplated reorganization of Gonzalez Chemical Industries, Inc., in which it is expected that Grace will acquire a substantial amount of stock in the Puerto Rican company. Negotiations to this effect are continuing.

Under the management contract, Grace will supply managerial, administrative and technical personnel, technical know-how and production services.

The Gonzalez plant was designed and built by the Lummus Company of New York in 1956. Design capacity is 125 tons per day of ammonia and 350 tons per day of sulfuric acid which are combined to make over 400 tons per day of ammonium sulfate used as a fertilizer for the island's important agricultural economy.

Built at a cost of more than $12 million, the plant is the first and only ammonia-ammonium sulfate plant in Puerto Rico and was built to make the island more self-sufficient as a basic chemical producer for industry and agriculture.

William J. Haude, President of Grace Chemical Division, announced that under the contract all production matters will be supervised by John G. Carriere, vice president of the Grace Chemical Div. Harold S. King, controller of the Division, will handle all financial and organizational matters. Lloyd E. Lundahl, formerly manager of Engineering and maintenance of Grace Chemical Division at Memphis, is the new manager of the Gonzalez plant.

JOINT CANADIAN—U. S. WEED CONFERENCE

Canadian and U. S. weed problems will be highlighted when weed control experts and officials from both nations meet at the Joint Western Canadian and North Central Weed Control Conference to be held on December 8, 9 and 10 at the Royal Alexandra Hotel, Winnipeg.

This conference affords many weed workers in both Canada and the United States an excellent opportunity to share, with one another, research findings in weed control. Many advance registrations have already been received and the conference arrangements committee expects an attendance of at least 600.

Numerous papers will be given by scientists, fieldmen and administrators from both countries, on recent advances in weed control. The program will include general sessions and some sectional meetings.

AGREEMENT ANNOUNCED ON PESTICIDE DEVELOPMENT

Fisons Pest Control Limited, Essex, England, and Spencer Chemical Co., Kansas City, Mo., have announced an agreement whereby Fisons will be granted an exclusive license to distribute and develop a new Spencer herbicide in Western Europe and Scandinavia. It is hoped, they report, that the agreement will lead to more extensive collaboration between the two companies in the pesticide field.

Carbyne, the herbicide, is a selective weed killer. It is especially effective in controlling wild oats in wheat, barley, flax, peas and sugar beets, Spencer said. Chemically, Carbyne is 4-chloro-2-butynyl N–(3-chlorophenyl) carbamate.

AOAC, AAFCO ELECT OFFICERS

At its recent Washington meeting, the Association of Official Agricultural Chemists named John B. Smith, University of Rhode Island, president; C. O. Willitts, USDA Regional Laboratory, Philadelphia, vice president; and William Horwitz, Food and Drug Administration, secretary-treasurer.

Named by the Association of American Fertilizer Control Officials are: Stacy Randle, New Brunswick, N. J., president; C. J. Marshall, Ottawa, Canada, vice president; and Bruce Cloaninger, Clemson, S. C., secretary-treasurer.

Meeting Highlights

THIS MONTH:

National Fertilizer Solutions Association Convention

Statler Hilton Hotel, St. Louis, Mo.

November 8. A solutions equipment style show will be held in the afternoon and "Show Boat", an old-fashioned melodrama on the last surviving river Show Boat will be seen in the evening.

November 9. During the morning, the general session will open with the president's address, followed by election of directors, a presentation on a "New Use for Your Most Important Product" and a talk on "Why Are You in Business?". Conference rooms will be open during the afternoon and evening.

November 10. General session includes discussion of "Solutions and Suspensions" by W. S. Newsom, Jr., International Minerals & Chemical Corp.; and Edgar W. Sawyer, Jr., Minerals & Chemicals Corp. of America.

"Green Acids" will be the subject of a representative of General Chemical Div., Allied Chemical Corp.; "Formulations," H. H. Tucker, Sohio Chemical Co.; and "Corrosion," Murray C. McJunkin, United States Steel. A panel—consisting of J. E. Tuning, Spencer Chemical Co.; James L. Brown, Monsanto Chemical Co.; and Dr. Edwin C. Kupusta, United States Potash Co.—will discuss nitrogen, phosphates and potash, respectively. At 2:00 p.m., a panel will try to find the answers to "What's Bothering You?" Participants are Nelson D. Abell, Edwin C. Aylward, E. E. Crouse, L. T. Stone, Edward A. Wex and Morris Woosley. At the annual dinner, an award will be presented to the "Man of the Year for 1959" and new officers will be introduced.

WASHINGTON VIEWPOINT

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There's a bright outlook for farm chemicals sales over the next few years. One economist says "A continued large expansion in fertilizer use is likely."

Although the 1960 cotton allotment will be the same as in 1959, a big change in the progrom is scheduled for 1961.

The outlook for farm chemicals sales over the next few years is bright—despite the fact that the outlook for farm incomes is gray. Farm economists increasingly are adding their optimistic views on the years ahead to those of industrial economists who anticipate continued uptrends in fertilizer and pesticidal chemical sales.

Agricultural Department economists and experts at Land Grant Colleges in major farmstates almost unanimously are predicting continuation of the current upward trend in fertilizer use, high yields, and increased livestock production. Economist Francis A. Kutish of Iowa State University's Agricultural Adjustment Center declares flatly, "A continued *large* expansion in fertilizer use is likely."

The forces that encouraged expansion in fertilizer use during the past 5 years are expected to continue unabated during the next five, Kutish predicts. Farmers not only will push for bigger volume, but *must push* for bigger volume to survive.

The tip-off to continued strong chemical sales are official predictions that farm income during the next 4–5 years will be "much lower" than in 1957 and 1958 when net income averaged about $12 billion. This will come largely from a lower level of farm commodity prices. Farm reaction to reduced prices will be to produce greater volume. This pressure will force increasing numbers of farmers out of production—but, on the other hand, will bring about consolidation of a larger proportion of production under direction of more efficient farmers with adequate operating capital and facilities.

Biggest price & income declines are expected in the Midwest feed-livestock economy. Corn prices during the next 4–5 years are likely to drop to between 85c–$1 a bushel compared with the $1.25 actually received during the past year. This is expected to result in increased hog production and hog prices to around $14. If hog prices go much below this level, farmers are not likely to let up on corn output. Instead, they are expected to put corn into the government loan rather than feed it.

As for crop yields over the next 4–5 years, new studies indicate that per-acre output is likely to continue steadily upward. These studies indicate that a straight-line projection of yield trends from 1940–1958 provide a solid indication of what to expect in the years ahead.

For 1960, specifically, government economists expect farmers as a group to fare somewhat worse than they did in 1958, when gross income was $38 billion, and 1959, when gross slipped to $37.4 billion. The 1960 projection is for gross income down almost to $37 billion. Net income in 1960 is estimated at close to $11 billion, compared with $11.5 billion in 1959 and $13.1 billion in 1958. Production expenses in 1960 will be the highest on record, above $26 billion, compared with 1959's $25.8 billion and 1958's $25.2 billion.

Financial condition, 1949 versus 1959. With the decade of the 1960's just around the corner, following is a run-down of agriculture's financial condition as farmers enter a new decade, compared with the condition as they entered the 1950's.

Farmers now hold about the same proportionate equity in their assets as in 1959—both assets and equity went up about 1/3. Assets went from $132 billion to $203 billion; equity, from $120 billion to $180 billion. But farmers went deeper into debt and relied more on government programs to maintain equity. Total farm debt doubled since 1949, from $11½ billion to more than $24 billion. Farm mortgage debt increased from $5.3 billion to $11.8 billion. Non-real estate debt went from $6.1 billion to $12 billion.

Paper value of farm real estate was $76.6 billion in 1949; $126 billion in 1959. Non-real estate physical assets went from $39 billion to $58 billion. Financial assets, bank deposits, bonds, and co-op investment went from $16 billion to almost $19 billion now.

Government expenditures on farm-income related programs went from about $2 billion to almost $5 billion. Direct payments to farmers quadrupled from $283 million to over $1.1 billion. Federal investment in price-supported commodities leaped from $1 billion in 1950 to $8½ billion in 1959.

Realized net farm income 10 years ago was $12.8 billion, compared with an estimated $11.5 billion this year. Farm prices now are 3% below the start of the 'fifties. Farm production costs are 19% higher. The parity ratio—the ratio between prices and costs—has declined from 100 of the 1910–14 base to 81—the most unfavorable level since 1940.

The number of farms has declined from about 5.4 million in 1950 to an estimated 4 million in 1960. The number of Americans to be supplied went from 150 million to 179 million.

The 5-year farm land boom now appears to have halted—and a downward adjustment is due, although experts do not at this point believe that a collapse is in the making. Land values last spring increased

(Continued on page 14)

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It digs and carries 2,500 lbs. low and close with good balance and fullest operator visibility. Power-steering and only 6-foot turning radius, power-shift transmission with torque-converter drive, and powerful hydraulic brakes all assure the operator of safe, easy and accurate control. He can maneuver around corners, through narrow aisles, doorways and crowded yards, up and down ramps with speed and safety.

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our IMC transportation service man knows hat shipping delays can do to your sales during sh seasons . . . he knows the inconvenience you through in waiting for settlement of dam- e claims . . . he knows that a change in routing n mean lost days and lost sales dollars.

IMC's transportation group handles millions tons of fertilizer material every year. Much our transportation law experience was gained efore the I.C.C. We can back you up in your alings with railroads, commissions and legis- tive bodies with the prestige we've gained as a rge volume shipper.

Only International can give you thorough transportation service of this extensive scope.

International pioneered a barge system to speed shipments up the nation's inland waterways. We maintain rolling warehouses — loaded boxcars — ready to move to you at a moment's notice. "On-site" warehouses, located in major trade areas, help you meet peak load needs promptly without high-cost rush shipment from distant points.

Your IMC transportation service man is interested in your whole transporation problem . . . getting materials to your plant . . . out to your customers . . . on time and at low cost. He has a mission of total service. He awaits your call.

Products for growth*

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INTERNATIONAL MINERALS & CHEMICAL CORPORATION

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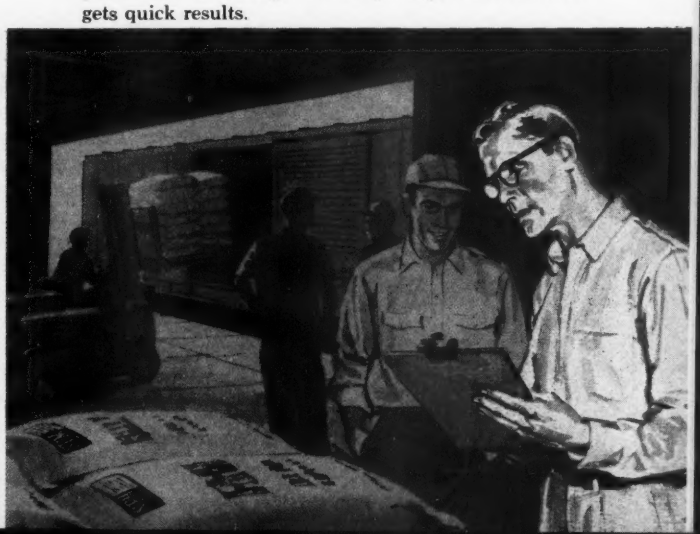
He determines best routes for shipping. His knowledge of loading and transportation techniques gives low-cost, on-time delivery.

He helps you solve shipping problems from your own plant. His knowledge of and prestige with carriers gets quick results.



What's Coming Next Month

How will the manufacture and sale of fertilizers and fertilizer materials stack up with the Gross National Product in 1974?

Thomas E. Ware, president of International Minerals & Chemical Corporation, told his stockholders at their 50th Annual Meeting last month that expected growth in demand for total plant food nutrients is about 5.3 per cent, compared to a predicted annual rate of growth of 4.4 per cent for the Gross National Product. This is 20 per cent greater than the GPM!

The above figures are based on 1957 as the base, projecting the curve on through today and into 1974.

Ware pointed out that IMC has been growing at a rate of 13 per cent greater than the rest of the industry. The two factors which he listed as being the principal reasons for IMC's growth will also be discussed in one of next month's major features. They are:

1) Market opportunities and

2) The evolution and execution of carefully planned programs to make the most of opportunities.

The article will be . . .

■ **MARKETING IN THE '60s**

This will be a report of the first annual FARM CHEMICALS Marketing Seminar (FCMS). An attempt will be made to show you how to make your own market opportunities in the "golden sixties."

■ **FERTILIZER INDUSTRY ROUND TABLE**

A summary of the latest fertilizer manufacturing methods will cover such subjects as "Plant Processes From Raw Materials to Bagging," "Mechanics of Calculating Formulations" and "Models Replace Blueprints"—to a discussion of "Pre-Neutralization."

WASHINGTON VIEWPOINT

only 1%, the smallest rise since 1956, except for a short period in the winter of 1957–58. Land values now are "over-priced" about 30% according to the historical relationship of land values and farm income. *A new USDA study* of trends during the past 48 years indicates that whenever land values rise 8 times the annual net farm income, land values soon adjust to a more normal relationship. A normal ratio is considered to be about 6-to-1. By next spring, USDA believes the ratio will be 9-to-1.

Land is most over-priced, according to the historical study, in the Southern states extending from Georgia to, and including, Texas, and in the Mountain states, with the exception of Montana.

Public opinion is the key to farm program changes in 1960. Secretary Benson recognizes that if he's to get lower price supports on wheat, tobacco and peanuts, he'll have to do it by whipping up public pressure. He plans to do all he can to bring this about. *Benson now has the backing* of top political advisers to the National Republican Committee, in addition to that of the Agricultural Advisory Commission appointed by the President. This provides a solid base for publicity. His ace in the hole is President Eisenhower's TV-radio appeal to the people slated for some time in January. The President's person-to-person appeal to the country put across this year's labor reform bill. The same technique, the Administration hopes, will do the same thing for further farm program reforms.

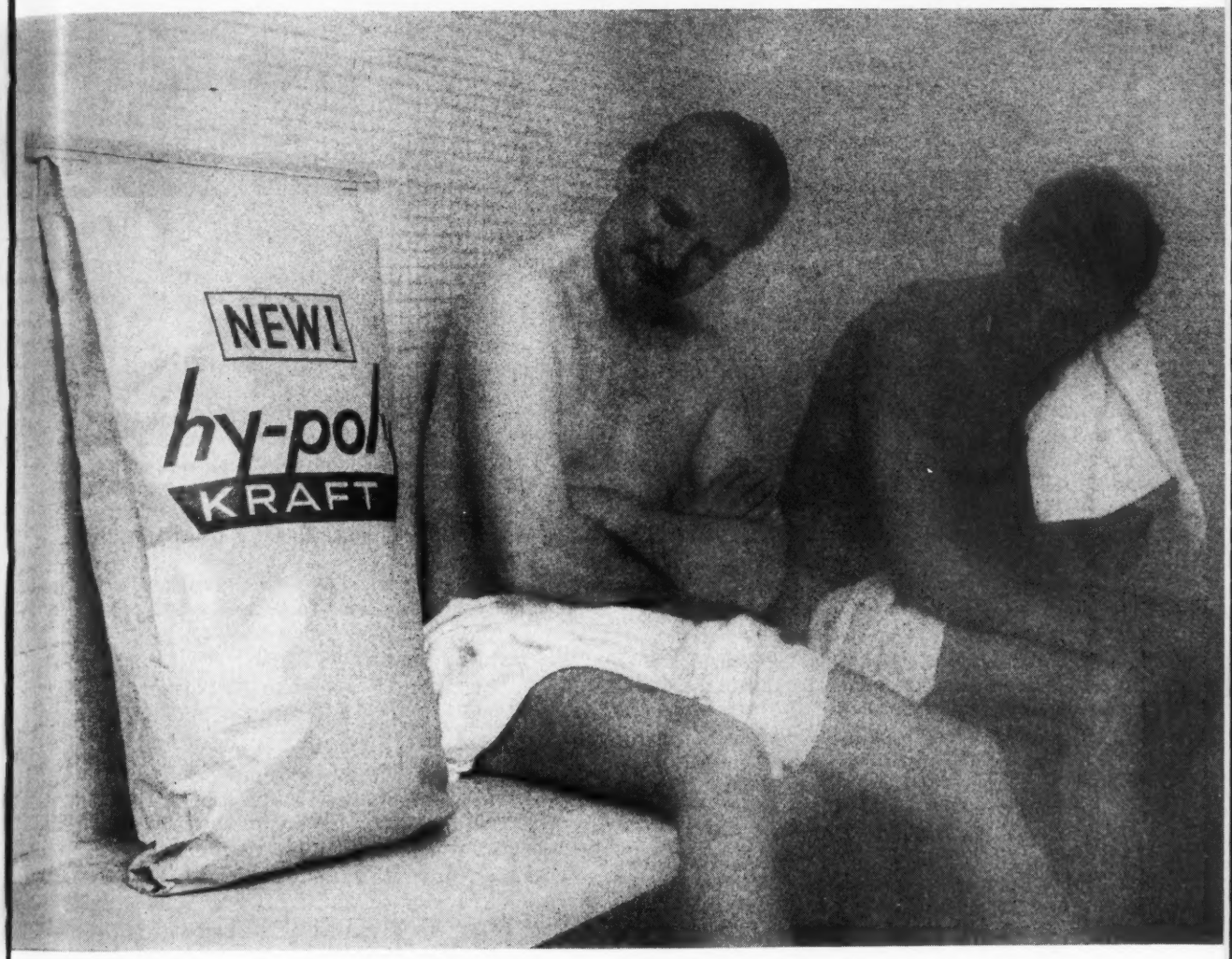
1960 cotton allotment the same as 1959. The USDA has announced it will continue essentially the same program for cotton in 1960 as in 1959. That is, the national acre allotment will again be at 16 million acres, and growers can decide either to stay within the allotments in return for price support at 75% of parity, or increase allotments 40% in return for support at about 60% of parity. Only significant change from this year is that price support rates are dropped 5%.

A big change in cotton program is scheduled for 1961. With that crop year, the option to increase plantings 40% will be eliminated. All growers will be offered price support at approximately 70% of parity, and the national acreage allotment will be held at 16 million.

Wheat surplus disposal is in for a big push next year. Some officials believe plans now being developed may eventually turn the surplus situation into one requiring *increased* production. Two high-level international groups have come up with essentially the same idea—which increases chances for adoption by this country.

The idea is to have the world's exporting nations club together in programs for famine relief, special emergencies and nutritional improvement in underdeveloped countries. This would include establishing reserves in those countries where U.S. and other surpluses could be stored.

Now International Paper saves you $5 to $16 per thousand PE multiwalls!



Read why new humidity-proof "Hy-poly" kraft makes medium and low-density polyethylene sheets extravagant!

THE multiwall bag you see taking a Turkish bath in our picture contains *calcium chloride.*

We steamed this new Bagpak® multiwall in 95% relative humidity at 120° F. for 48 hours. (Unprotected, under these conditions, this chemical takes on 2½ times its weight in water in about an hour!)

But when we opened up the bag, the thirsty crystals spilled out as though they had been stored on the Sahara!

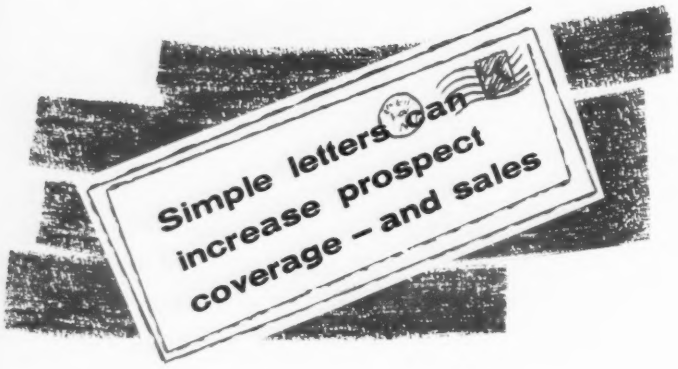
And Bagpak's new Hy-poly kraft *saves you money.* You stand to save from $5 to $16 per thousand multiwalls!

That's because new Hy-poly kraft is so superior to medium and low-density PE sheets that you get equal, if not greater, moisture-vapor protection from a coating approximately *half as thick!*

Extensive laboratory tests prove that this dramatic new barrier sheet is superior in *every way.* Write us today for samples.

See how calcium chloride protected by Hy-poly kraft Bagpak, pours after 48-hour steam bath!

Bagpak Division **INTERNATIONAL PAPER** New York 17, N.Y.



How the F
CAN HELP Y

Seventh in an FC series on "Successful Selling"

By TED POLLOCK

THINK you could sell more if—

▶ The entire population of Cincinnati was working for you?

▶ 100,000 "assistant salesmen" were placed at your disposal?

▶ You could work out of any of 36,000 conveniently located "offices"?

Dream stuff? Not at all.

For pennies—*just four of them*—you can command all these resources!

That's the price of a postage stamp—your ticket of admission to the biggest sales help bargain in the world today.

For any salesman smart enough to multiply himself by 100 per cent, 500 per cent—or more—Uncle Sam maintains a staff of 538,416 . . . 102,083 letter carriers . . . 36,308 post offices.

Properly harnessed, the U. S. Post Office can be an unbeatable selling tool. While you sleep . . . regardless of the weather or traffic—a letter will speed your sales message to the man you want to reach. It can cut down costly leg work, double or triple your "customer exposure," do a bang-up public relations job for you.

And don't overlook the unique wallop packed by a well-aimed letter. Composed at leisure, it allows you to marshal your facts and present your proposition in the most persuasive possible way. It commands attention, for it engages the eyes, the hands, the ears. Because of the effort involved, it is supremely flattering—it proves that you consider the recipient important. It is lasting, as is the impression it makes. It may be read and reread by a dozen different people, then filed away and perhaps read again months afterward.

In short, a letter can be as powerful an "open sesame" to a closed mind as it is to a closed door.

How?

Like this:

MAKE APPOINTMENTS

Better face it. To the prospect who doesn't know you, you're just another salesman, one of scores who compete for his attention monthly.

Before you can hope to sell him your product or service, therefore, you must sell him on seeing you.

What better opportunity to whet his appetite, set the stage for a favorable reception and separate yourself from the faceless competition than a succinct written description of the benefits you can bring him—if he'll see you?

That's exactly what a sales representative for a fertilizer firm did in the following letter to a prospect:

Dear Mr. Carter:

Unless I'm absolutely crazy, you're losing at least $4,000 a year on crop failure, according to a little arithmetic I did this morning.

I want to show you these figures as well as an unbelievably simple way to realize a profit where you are now experiencing a loss.

If my figures are right (and knock them apart if they aren't), then my visit may be worth about $250 a minute to you.

Would next Tuesday at 10:30 suit you? I'll phone this Thursday and if another time is better for you, please let me know.

Sincerely,

If you were that prospect, could *you* disregard that letter? Almost certainly not.

Notice what it manages to do within its four short paragraphs. Paragraph one immediately galvanizes the reader's attention with important *news*—he's losing a considerable amount of money. The salesman has even taken the trouble to determine the approximate size of the loss. It is apparent at once that the writer of this letter is no mere order-taker, but a *benefit-minded, customer-oriented* salesman.

Paragraph two teases the reader with the *promise*

Post Office
YOU SELL

of an easy solution to his problem, at the same time spelling out precisely what the salesman wants—a chance to see him and fulfill his promise.

Paragraph three indicates *confidence* in the solution and subtly sets a time limit to the appointment.

Paragraph four emphasizes the salesman's confidence in getting the appointment he seeks ("Would next Tuesday at 10:30 suit you?") and suggests a precise time. The final sentence presents an alternative plan for getting together—just in case.

In less than 100 words, that letter accomplishes everything that a request for an appointment should accomplish. It tells *why* an appointment is desirable from the prospect's point of view, *what* its subject will be, *when* the salesman would like to have it. The *how* of the solution is purposely omitted to pique the prospect's curiosity, although—like the identity of the writer—it may be deduced from the stationery.

It isn't difficult to visualize that letter being separated from the day's mail for further action.

Yours will, too, if you bear in mind that few prospects can resist the triple bait of *news*, *benefits* and *confidence*.

CLINCH SALES

Few sales are made on the spot, particularly when a sizable amount of money is involved. There is a natural tendency toward inertia among even the best-intentioned of buyers.

Frequently, a well-timed letter from the field or office citing the success of your product or service elsewhere can nudge the quiescent prospect into decisive action.

Thus, in an attempt to close a long-overdue sale, a salesman sent a farmer this letter from a nearby town:

Dear Mr. Davis

I just went over the figures with Consolidated Farm's owner, Mr. Carl Whitmore, and since his products and problems so closely resemble yours, I think you will be particularly interested to hear of the outstanding results he has had with our Number 20 fertilizer.

During the past year alone, Mr. Whitmore says, Number 20 has been directly responsible for a 17 per cent increase in yield.

Mr. Whitmore calls Number 20, "The biggest cost-cutter we've run across in a decade."

I have asked him whether he would kindly permit your foreman to visit him at a mutually convenient date so that you might get the complete story. He graciously suggested that you name the date.

When I see you on the 12th, you can tell me when the best time would be and I'll be delighted to make all necessary arrangements.

Sincerely yours,

This letter tells a very persuasive value story. It names names, gives an actual figure, includes a favorable comment by a qualified judge. The writer has stuck his neck out by inviting his prospect to sit down with a user of his product, a third party who is intimately familiar with the problems of farming and can have no vested interest in another farm's use of Number 20 fertilizer.

As a conveyor of testimonials and subtle sales clincher, a letter is the very next best thing to a personal call. In a way, it's even better, for the fact that you are willing to go on *written* record is proof of your sincerity.

IMMEDIATE FOLLOW-UP

Because the memory is so fragile a thing, it is too much to expect the average prospect to recall every fact brought up during a sales call.

A letter, in which you restate the main points of your presentation, can help him weigh your proposition, explain it to any associates he may have to consult or use it as a gauge against which to measure competitive offers or inaction.

Consider the effect of this "nutshell" check list of benefits, sent by the sales representative of a fertilizer firm to a Western farmer:

Dear Mr. Harris:

A quick run-down of some of the ways you--and your farm--can profit from National fertilizer:

*Increased yield per acre.
*Less wasted acreage.
*Bigger profits.
*Prestige.

And thank you for the opportunity to tell the National story. If there are any questions you would

like answered, please do not hesitate to call.

Cordially,

Some salesmen prefer purposely to withhold some of their selling points during a personal call in order to have a reason for dropping a note—or a series of them—to a prospect.

Favorite openings include: "I neglected to point out one of the biggest advantages in owning a . . . " "One thing I forgot to mention this morning . . . " "Another good reason for using our product is . . . "

GET TESTIMONIALS

The sales manager of a farm machines firm has found that prospects for his machines are most impressed by testimonials that come from people who live within the same state. Several months after a farmer buys his machine, therefore, he sends a letter like this one:

Dear Mr. Shaw:

Now that you have had an opportunity to see the Ajax Super-Spreader in action on your farm, we are most eager to know your reactions to it.

I should personally appreciate your comments--particularly on your hands' enthusiasm for the machine--low maintenance costs--time saved--your own opinion of the Super-Spreader as an economical farm tool.

Any other comments you find it appropriate to make will be very deeply appreciated.

Sincerely,

It has been his experience that generalized requests for testimonials seldom produce the kind of statements that can be used by his salesmen to influence prospects; hence, he pinpoints the areas in which he would like comments. Without actually writing the testimonial for the farmer, he guides its composition along the most useful possible lines.

ASK FOR LEADS

Dear Mr. Long:

There's a birthday at our house next week (mine) and I'm going to do something unusual. I'm going to ask you for a present.

Would you jot down the names and addresses of two friends who you think might benefit from a tractor like the one you bought from my firm last year?

The enclosed envelope, delivered by my postman, would sure brighten up one old man's day.

Thanks.

Sincerely,

P. S.

Like your product—like yourself—your letters will do a better selling job if their packaging is attractive. These attention-grabbers have worked for many salesmen:

- ▶ Air mail
- ▶ Bulky envelope
- ▶ Special delivery
- ▶ Large envelope

A top tractor salesman has found that whimsical appeal to a client's generosity is an almost sure-fire lead-getter.

The following letter, successfully used by the sales staff of an Eastern casualty insurance firm, automatically goes out to every new client:

Dear Mr. Morgan:

This is the biggest THANK YOU possible on this typewriter . . . and I hope it will tell you how much I appreciate writing the insurance on your new house.

I hope too that you will be pleased with the way I take care of your insurance for you. You can be certain that I will do everything possible to merit your confidence in me.

Do you have any friends who require casualty insurance? You could do them--and me--a favor if you would write down their names and addresses on the enclosed card. Postage is on us.

With kindest regards,

Most people enjoy doing favors. Especially if they're approached in the right way.

KEEP IN TOUCH

As long as you have a pen and paper, there is no earthly reason for you or your company ever to blur in a customer's mind.

Run across an ad that Sam Jones in Center City might be interested in? Clip it out, attach a brief note and mail it to him. Joe Walsh's son graduating? How about a letter of congratulations? Hear of a second-hand car for sale for Al Cooper? Drop him a line. Appreciation has a funny way of turning into sales.

George Strauss, vice president of American Kitchen Products Co., conducts a voluminous correspondence with customers throughout the country. Much of it consists of such personal triumphs as moving into a new home, the anniversary of moving into a new home or a child's entering school.

"Once the habit is formed," explains Mr. Strauss, "it becomes second nature to drop personal notes to customers."

(*Continued on page 59*)

FARM CHEMICALS MARKETING SEMINAR

The "total marketing concept" will come in for full play Nov. 16-17 as industry leaders meet with leading marketing authorities for the first major discussion of industry marketing problems. The place: Barbizon-Plaza Hotel, New York City.

WHAT are the main problems of pesticide and fertilizer marketing? How does a farm chemicals manufacturer go about instituting the "total marketing concept"? These are two of the questions to be discussed at the first FARM CHEMICALS Marketing Seminar (FCMS) at the Barbizon-Plaza Hotel, New York City, November 16–17.

THREE PANELS ARE FEATURED

Sponsored by FARM CHEMICALS, oldest publication of its kind in the country, FCMS will feature three panels. The first will be a discussion of the "Meaning of Marketing"; the second, "Marketing Research and Sales Planning"; and the final one, "Analyzing Product Distribution Programs."

Industry leaders throughout the United States have come to realize in recent years that the key to future profits and growth rests with the modern marketing concept.

In today's competitive industry, it is necessary to know all characteristics of your market with particular emphasis on present and future consumer needs. From this point on—with enlightened judgment in planning and execution—product development, manufacturing processes, and marketing efficiency will fall into a properly coordinated, single effort, producing a larger, more profitable market than ever before.

SEE THE FOLLOWING PAGES FOR DETAILS

On the following pages are descriptions of subjects and information about the speakers' backgrounds. We feel that we have lined up some of the outstanding authorities in the field of marketing.

Registration is $25 per person for those associated with the industry; $35 per person for all others. This includes two luncheons, a cocktail party, coffee and pastry breaks, plus a complete proceedings of the Seminar which will be distributed at a later date.

. . . The Speakers

ROGER W. COHILL, *vice president in charge of sales for Miller Chemical & Fertilizer Corporation, was graduated from the University of Maryland, where he majored in entomology, with a B.S. Degree in 1947. He was employed by Miller Chemical as entomologist in 1947, and later held positions of assistant sales manager, sales manager of Pesticide Division and general sales manager until appointment in 1955 to his present position. All phases of selling fall under Mr. Cohill's direction, including advertising, technical service, sales programming, selling budgets, sales personnel management, customer relations and future planning.*

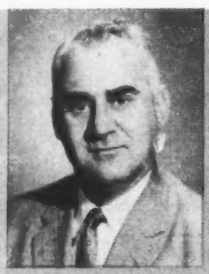
PHILLIP ALAMPI, *New Jersey Secretary of Agriculture, received a Bachelor of Science degree in agriculture from Rutgers University in 1934. In 1935 he investigated poultry market practices in New York City for the federal government. A teacher of vocational agriculture for 10 years, he received a Master of Education degree from Rutgers. He has conducted farm and garden radio and television programs and in 1955 was recipient of the American Farm Bureau Federation award for the most outstanding interpretation of agriculture to the American public.*

CHARLES E. ST. THOMAS, *President of the management consultant firm St. Thomas Associates, holds a B.A. in economics from the University of Maine and an M.S. from the Columbia Graduate School of Journalism. In 1949–50 he was administrative assistant to the President, University of Bridgeport, Conn., and in 1950 joined General Electric Co., where he worked in the news bureau and in advertising and promotion. He later became specialist—marketing services communications for GE. He is author of "How to Get Industrial and Business Publicity," published by Chilton Co., and of a chapter in the book, "Effective Marketing Action."*

MANUEL H. PARSEGHIAN, *Account Executive, National Analysts, was graduated from Ursinus College in 1951 with a B.A. degree in history and political science. After three years service in the Army, he attended the Wharton School of the University of Pennsylvania and majored in marketing. He received his M.B.A. degree in 1956. Before joining National Analysts in 1956 he taught marketing at the Wharton School and at the Charles Morris Price School of Business. In his present position he is in contact with clients and other firms to discuss their marketing problems and develop suitable research plans to solve them.*

LEE HANOWER, *Director of Market Research, Nitrogen Division, Allied Chemical Corporation, graduated from Massachusetts Institute of Technology with a B.S. degree in chemical engineering. He was employed by Esso Standard Oil, and Monsanto Chemical Company's Plastics Division before joining Nitrogen Division in 1952 as a product development specialist. In 1954 he became a business consultant for Ebasco Services, industrial engineering and construction consultants, and in 1956 returned to Nitrogen Division as director of market research.*

JOHN R. SARGENT, *Partner in charge of the Marketing Division of Cresap, McCormick and Paget, a management engineering firm, graduated from Haverford College in 1933 with a B.S. in engineering. He received a Master's Degree in electrical engineering from the University of Pennsylvania in 1934. Mr. Sargent has been in charge of market research and development for Smith, Kline & French Laboratories, managed market development for Westinghouse Electric Corporation and was a vice president and director of George Armstrong & Co. in New York. In 1947 he joined Cresap, McCormick, and Paget.*



L. S. KANIECKI, *Manager of Chemical Sales, Tennessee Corporation, graduated from Georgia Institute of Technology with a Bachelor of Science degree in chemical engineering in 1936. He joined Tennessee Copper Company, a Tennessee Corporation division, following graduation, and was engaged in production and research. In 1940, he transferred to Tennessee Corporation's Sales Department and was called to active duty in the Navy in 1941. He rejoined Tennessee in 1945, was promoted to assistant sales manager in 1952 and to his present position in 1954.*

VERNON H. VAN DIVER, SR., *is Publisher of Brad-Vern's Reports; author of a series of studies of effect advertising has on sales, which is basis of the special reports running in "Printers' Ink"; and a leading authority on trade and institutional advertising. Through the past ten years he has served as a consultant to a number of concerns, including several in the chemicals business. Prior experience ranged from sales and advertising work with Ingersoll-Rand and the associate editorship of "Compressed Air" magazine through 19 years of advertising work with Union Carbide and Carbon Corp. where he directed creation and placing of advertising.*

HECTOR LAZO, *is Chairman of the Marketing Department, Graduate School of Business Administration, New York University, and Managing Director, Marketing Counsellors, New York. He spent six years with General Motors, at home and abroad, as manager of advertising and sales promotion; ten years as vice president and president, Cooperative Food Distributors of America; nine years as assistant to the president and director of marketing and public relations, Sunshine Biscuits, Inc. He is author of five books in the field of marketing and has a sixth one pending which will be published in the Spring of 1960 by McGraw-Hill.*

The Seminar Program

NOVEMBER 16, Morning Session: 9:00 a.m., Barbizon-Plaza Theater

Opening Address: SAM LEWIS VEITCH, Publisher, FARM CHEMICALS

Introductory Comments: ROGER COHILL, MODERATOR

First Panel: "THE MEANING OF MARKETING"

"Marketing—A Policy of Profit Insurance" ..... THE HON. PHILLIP ALAMPI
A marketing program recently adopted by the poultry industry in New Jersey is producing results for egg producers. Secretary Alampi will describe the program, and relate it to the farm chemicals industry to show the value of establishing brand identification and promoting your brand for customer loyalty.

"The Modern Marketing Concept and Its Importance to Farm Chemicals Manufacturers" ..... CHARLES E. ST. THOMAS
After defining marketing, Mr. St. Thomas will present the steps which must be taken by the management of any concern to get it started "down the marketing road." He will show exactly what being marketing-oriented means, how it affects the success of any company, and how the marketing approach differs from the sales approach.

coffee break . Question and Answer session

12:30 p.m.—Luncheon, North East Galleries

Afternoon Session: 2:00 p.m., Barbizon-Plaza Theater

Introductory Comments: ROGER COHILL, MODERATOR

Second Panel: "MARKETING RESEARCH AND SALES PLANNING"

"Marketing Research and Its Importance to Farm Chemicals Manufacturers". MANUEL H. PARSEGHIAN
The importance of the marketing function in the total operation, the inter-dependence of production and marketing, how marketing programs are formulated and the critical importance of information and facts for planning will be covered by Mr. Parseghian. He will define marketing research, explaining why it has come to be accepted and how it is used, and its role in the marketing program.

"How to Initiate Your Market Research Program" ..... LEE HANOWER
Ideas companies in the farm chemicals industry can use to conduct a marketing research program within their own organization with very small additional outlay of funds.

"Adaptation of Research Data to Sales Planning" ..... JOHN SARGENT
Mr. Sargent will discuss the application of market research to sales planning . . . how to make sales forecasts, and how farm chemicals manufacturers can use such forecasts.

coffee break . Question and Answer session

5:30 p.m.—Informal Reception, North East Galleries

NOVEMBER 17, Morning Session: 9:00 a.m., Barbizon-Plaza Theater

Introductory Comments: ROGER COHILL, MODERATOR

Third Panel: "ANALYZING YOUR PRESENT PRODUCT DISTRIBUTION PROGRAM"

"Responsibilities of The Sales Manager" ..... L. S. KANIECKI
Principal emphasis will be placed on the responsibility for developing men capable of moving on to higher management positions within the corporation, and the responsibility for thoroughly indoctrinating sales personnel in company sales policies, to assure that the corporation gets maximum return on its heavy capital expenditures for products.

"Increasing Your Share of the Market" ..... VERNON H. VAN DIVER, SR.
Automated mechanics of marketing are subject to the same order of scrutiny regularly given to the use of farm machinery and fertilizer in growing corn. Mr. Van Diver will apply government formulae and methodology of forecasting corn yields to industry marketing problems to show the effect changing volume of sales effort has on changing volume of sales.

coffee break

"How To Be a Constructive Critic of Your Present Marketing Program" .... DR. HECTOR (DON) LAZO
A guide to marketing for the industry. . . . Clarifying marketing goals, methods of attaining such goals, and personnel required to efficiently execute the methods.

12:30 p.m.—Luncheon—North East Galleries

Afternoon Session: 2:00 pm., Barbizon-Plaza Theater

Summary of Morning Presentations: ..... ROGER COHILL, MODERATOR

Question and Answer session

HOW CAN THE PESTICIDE INDUSTRY INCREASE sales and profits?

By LOU F. CZUFIN
California Spray-Chemical Corporation

I IMAGINE that over the years at various conventions and meetings there have been many answers to this question. Depending on who is giving the answer, the solution alternately seems to lie in more research and development; better products; better distribution; skillful salesmanship; better pricing policies; tighter credit and so on. The advertising man will readily acknowledge the impelling necessity for research, sales manufacturing, credit, and packaging. But try to find anyone *else* in our industry who will ever admit (unless under duress) the urgent need for the advertising and promotion of pesticides! Therefore, before going any further with this subject let me make a small plea for a more sympathetic attitude towards us poor advertising guys—let's all work together for the betterment of our industry—and, incidentally, let's give some mutual protection to each others' jobs!

In the short time that we have been allotted for this subject, I should like to make three points:

First, we need to take a look at the fundamentals—just what part does advertising play in the sale of pesticides?

Second, what are we spending on advertising and promotion of pesticides in relation to other industry programs, and

Third, what *should* we be doing?

First—let's forget about an exotic, sophisticated discussion of advertising. "Is advertising a capital investment or is it current expense?" "What about motivational research?" "Let's make sure we know how big the market is." Let's skip such advertising esoterica which is lots of fun but in my opinion practically valueless as far as our industry is concerned.

Let's go back to fundamentals and take another look at just what part advertising plays in making a sale.

STEPS IN "MANUFACTURING SALES"

At the risk of sounding elementary, the facts in our industry, and in a great many other industries, would indicate the need to be constantly reminded of the six steps in manufacturing sales.

Advertising saves your salesmen the first three big steps: *Contacting the prospect, arousing his interest*, and *creating a preference.* The dealer, distributor or company salesman now takes over and *makes a specific proposal, closes the order*, and *keeps the customer sold.*

For the second point, let's take a look at a very interesting figure, shall we? (Figure 1.)

Here we see a study which shows the total 1958 advertising in five trade classifications in a midwest state farm paper. This magazine happens to be Wallace's Farmer but this picture is typical of other farm media throughout the country as you will see shortly.

Many of us are familiar with the Iowa State College study on "What Influences the Farmer to Buy," with its strong statistical endorsement of farm papers and

Advertising saves your salesmen the first three big steps in making a sale, Lou F. Czufin told the National Agricultural Chemicals Association at its 26th annual meeting last month. At left he is shown making his presentation, with the help of an attractive assistant and Roger Roth, Velsicol Chemical Corporation.

Announcing the Appointment of

DAVIDSON-KENNEDY COMPANY
1090 Jefferson Street, N.W., Atlanta, Georgia

and

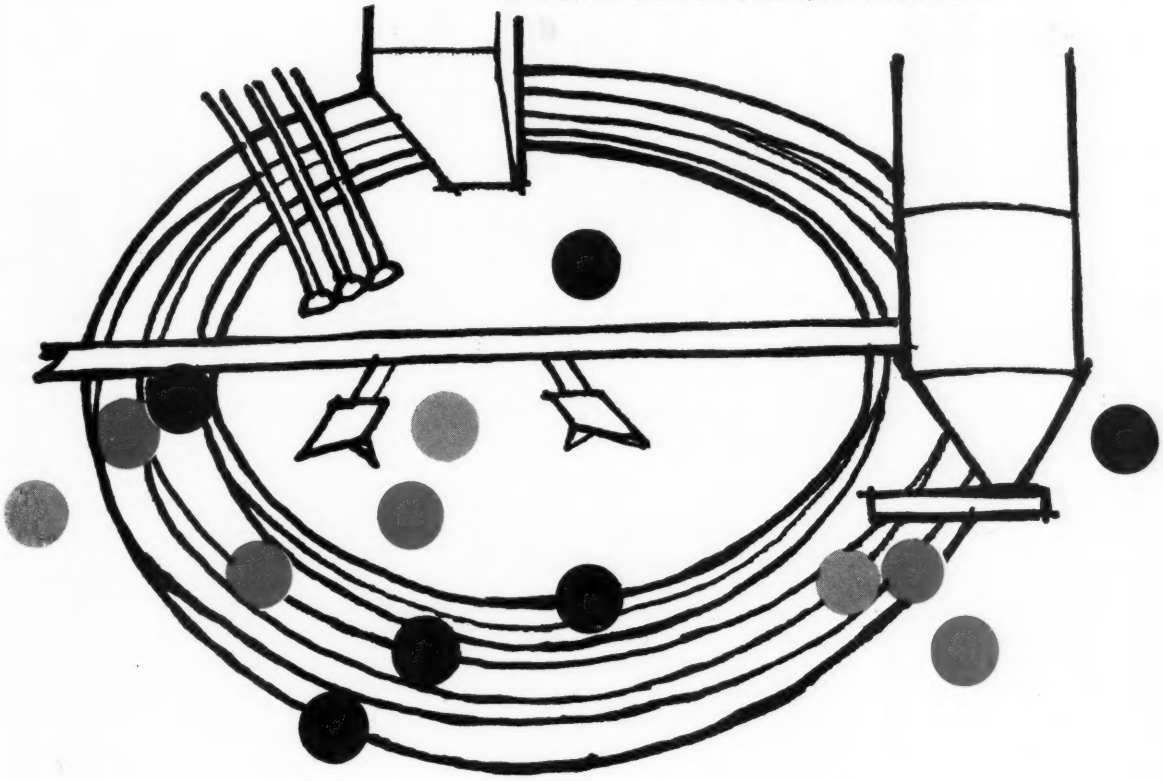
FERTILIZER ENGINEERING AND EQUIPMENT CO.
Green Bay, Wisconsin

as exclusive agents in the United States for

DUETAG

pan granulating process* and equipment

*Patent applied for, Patent Office, U.S. Department of Commerce



Duetag processes and patents make it possible to build installations, or expand existing plants with relatively small capital outlay. The simple manufacturing equipment requires minimum of maintenance and only three men are required to operate the unit. Lower packing costs result from easier collection and shipping of fertilizers. The process is presently being used to granulate both high and low analysis fertilizers including those containing minor ingredients and pesticides with excellent results and a minimum of rerun. Granules are spherical in shape, uniform in size and of high quality with exceptional storage qualities. The efficiency and economy of the machine has been proved in installations throughout the world. Please write for complete information and brochure.

DUNGEMITTEL-TECHNIK AG. / BASEL, SWITZERLAND

North American Agent and Demonstration Plant: William Houde, Ltd.
La Prairie, Quebec, Canada

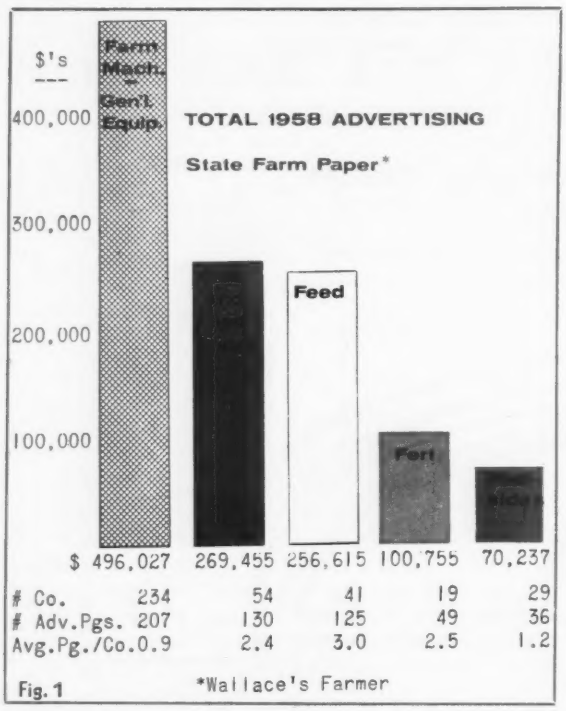


Fig. 1

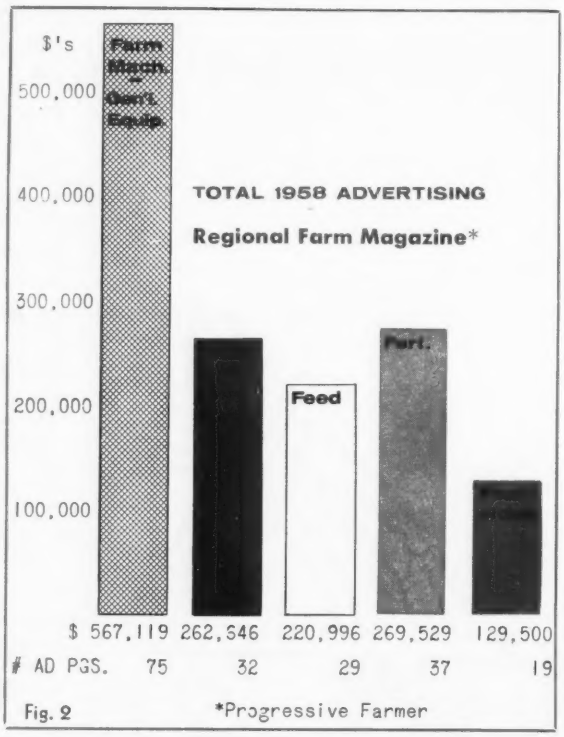


Fig. 2

magazines as effective sales tools in the introduction and sale of farm products.

Even though we may be familiar with the study, the people who are taking action on this endorsement are the farm machinery, remedy and feed supplement, and feed manufacturers. While we in pesticides feebly buzzed around the Iowa farmer with an industry total of 36 advertising pages during all of 1958, he was being clobbered by 207 pages of farm machinery advertising, 130 pages of remedy and feed supplement advertising, and 125 pages of feed advertising. A closer look at the figures shows that 29 pesticide firms only averaged 1.2 pages each for the whole year.

A "TREMENDOUS OPPORTUNITY"

Now, one might view these figures with the attitude, "Well, maybe the farm machinery business *is* seven times that of pesticides, so we're doing a proper job in relation to the market."

Our response to this would be first, that we know the *potential* for farm chemicals is much greater than one-seventh of the machinery market. All statistics seem to point to the fact that pesticides are in the pioneering or growth stage of development. Because of this, it is necessary for us to make a greater investment in advertising and promotion than that of a well established "accepted-practice" industry. Second, we should look at the tremendous *opportunity* any pesticides company has to move in and dominate any market that it chooses with powerful advertising and promotion. With an average of only 1.2 pages per company per year, a consistent program of say 12 to 18 pages per year of advertising for any single well-coordinated company would practically assure market domination.

Another figure of interest, there were *234* companies battling for the farmers' equipment and machinery business . . . and we thought *we* had competition!

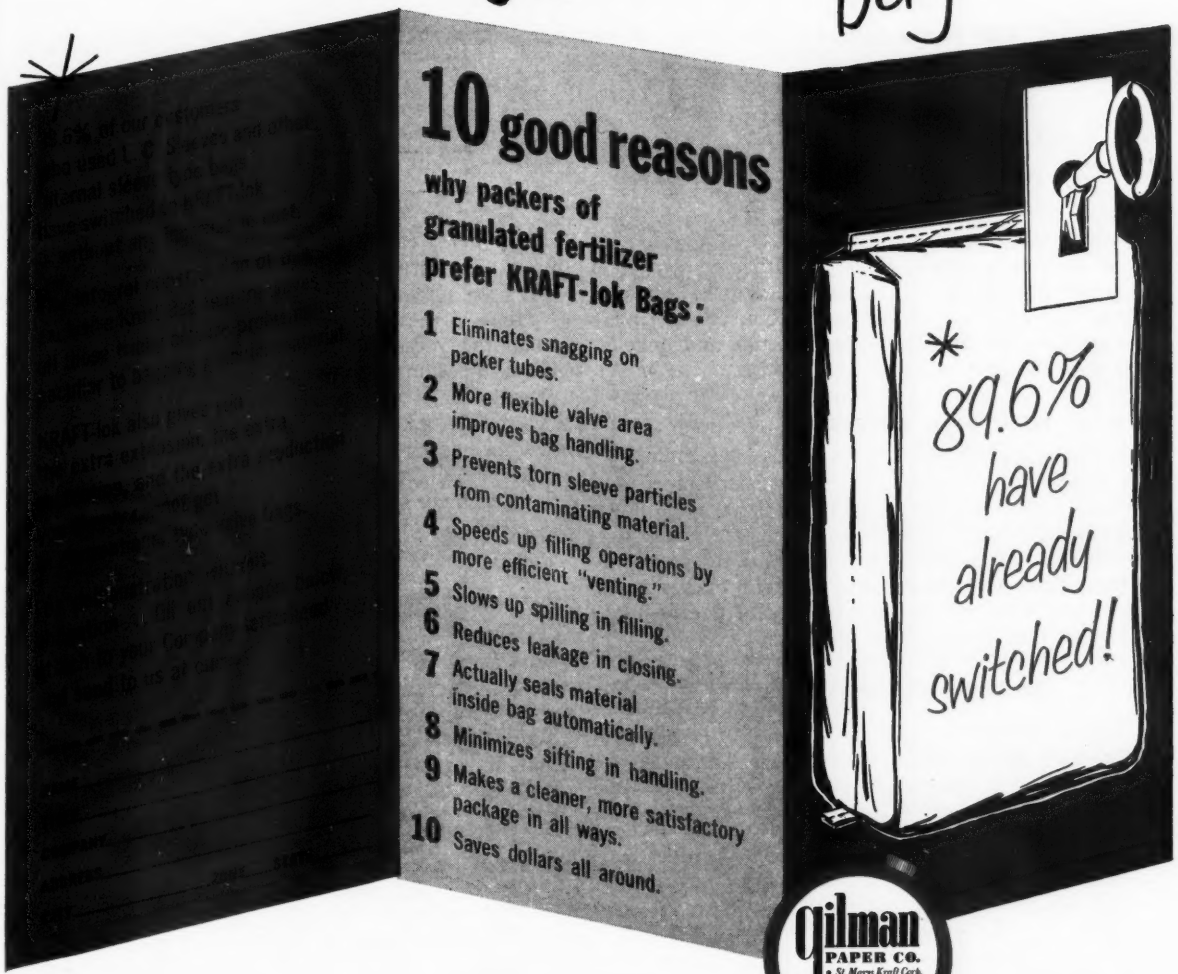
Examination of the advertising volume in the same five trade categories in a leading *Regional* farm magazine (*Figure 2*) shows pretty much the same comparisons. This study is on 1958 volume in Progressive Farmer which is issued 12 times a year as compared with 24 for Wallace's Farmer. Here again, pesticides ran a poor fifth in advertising expenditures in these five categories. A reminder: Here is a powerful advertising medium, skillfully designed so that your advertising will *contact*, *arouse*, and *create interest* with some 1,300,000 southern farmers and ranchers. So, what advertising does our industry run in this powerful magazine? A mere ripple of 19 pages for the whole year for the whole industry! We must draw the same conclusion, here lies a rare opportunity to earn an easy victory for any pesticide company that wants to tell an effective sales story in a dominant way. The investment would involve some 12 to 18 pages of advertising—and the southern farmers and ranchers would really be *contacted*, *interested*, and most certainly *aroused!* The pharmaceutical firms are doing it with antibiotics on the farm and the rocketing rise of *that* industry in agricultural sales is known to all of us. And by the way, antibiotics and insecticides have a lot in common insofar as marketing is concerned. We have found that a very large segment of agriculture doesn't use either one. At least, these farmers feel they don't *have* to use either one. They are extra expenditures that they feel they can get along without. However, the aggressive advertising and promotion tactics of the remedy manufac-

(*Continued on page 41*)

GOING GRANULAR?

Acclaimed the "BEST" when introduced years ago... KRAFT-lok is still recognized as the "BEST" today!

switch to KRAFT-lok® bags!



Gilman PAPER CO.
- St. Marys Kraft Corp.
- Gummed Tape Div.
- The Celluseal Corp.
- Kraft Bag Corp.

KRAFT BAG CORPORATION

Gilman Paper Company Subsidiary

630 Fifth Avenue, New York 20, N.Y. • Daily News Bldg., Chicago 6, Ill.

1 Responsibility
2 Integrated Plants
3 Generations of Bag Experience

HOW TO FIGURE $ALES POTENTIAL

For next year's business and the measurement of past and present performance, the sales potential estimate is a worthy tool.

By F. E. HARTZLER

A BRITISH STATISTICIAN has referred to business statistics as "Jiggery Pokery." In some respects this is not a bad definition. Marketing figures always have a disarming air of accuracy about them, but since we must do something, let's "jiggle and poke" along with the best of them.

EXAMINE YOUR OWN RECORDS

There are two factors to consider in estimating sales potential. The first is your own store of sales records. These must be looked at from three standpoints: sales in dollars, sales in units, and sales in terms of percentage increases. It is entirely possible for these three to present quite different figures and quite different results. For example, your figures just might look like this:

Illustration of Sales Record

Year	Sales in Dollars	Sales in Tons	Percent Increase in Units
1955	$1,000,000	20,000	—
1956	1,200,000	20,000	none
1957	1,400,000	22,000	10%
1958	1,600,000	24,000	9%
1959	1,700,000	26,000	8%
1960			

The figures in this illustration of sales record are, of course, fictitious, but they will serve as an illustration of some of the ways that increases in business may be measured. The first column shows the effect of inflation and then of toughened competition. It is not as good a measure as the second column which shows increases in units. This one is not as good for predicting future sales as the third column, which can serve also as a nice warning.

None of these measures, however, is quite as good as another measure which, while it is harder to derive, is apt to be a much better and more accurate test of the growth of your business. This measure has two possibilities and may be used in two ways.

This constitutes a combination measurement in either number of acres or number of customers. Since a mixer or formulator would probably be more interested in acres than in people, let's derive a measure from acres.

INFORMATION FROM MARKET AREA

First, we need some up-to-date information from the state or states in which you are operating. You need to find, if possible, a good local measure of the number of pounds applied to an average acre in your state. Let us suppose that your market man or sales manager finds that this figure is as follows.

Sample Measure of Pounds Applied to Average Acre

Year	Nitrogen	Phosphate	Potash	Value
1955	10 lbs	3 lbs	2 lbs	$1.80
1956	13 lbs	5 lbs	2 lbs	2.16
1957	15 lbs	5 lbs	2 lbs	2.40
1958	25 lbs	5 lbs	2 lbs	3.84
1959	30 lbs	4 lbs	3 lbs	4.45
1960				

It would not take a genius to fill out these columns

(*Continued on page 30*)

Take those big preseason savings on LION® E-2 now!

It's the one and only ammonium nitrate you can safely store for big spring markup and extra profit! Lion E-2 is free-flowing when you get it... free-flowing when you sell it... no matter how long you store it!

NO CAKING... GUARANTEED. Lion E-2 prills won't break down, crumble or cake under the heavy weight of stacking in shipment or storage. E-2 is free of dust and fines ... not affected by extreme temperature changes or humidity. You and your customers can buy now, store safely until used. Guaranteed storage-stable.

EASY-TO-HANDLE BAGS. Lion E-2 multiwall bags are specially coated with Monsanto Syton®—the antislip agent that lets you stack Lion E-2 higher ... move it faster ... handle it easier. It helps you save time, work and space ... reduces material losses through breakage due to slippage.

TAKES LESS STORAGE SPACE. Lion E-2 has the greatest density of any ammonium nitrate on the market. It's less bulky ... takes 20% to 25% less storage space. It saves you needed floor area. It isn't necessary to spread out E-2 in smaller stacks. With E-2 you stack higher utilizing all available storage area, without fear of caking. You can *safely* stack E-2 higher.

MONSANTO CHEMICAL CO.
Inorganic Chemicals Division
St. Louis 66, Missouri

Monsanto®

NEW LION E-2

Always stores...

Always pours

Photo taken at warehouse shows Lion E-2 stored in huge quantity (rows are stacked 27 bags high) with no danger of caking, shifting or sliding. Winter moisture won't cake Lion E-2 . . . not even the bags on the bottom. Lion E-2 won't cake in your storage area either . . . **we guarantee it.**

Order Lion E-2 Now . . . Order Big . . . Cash in Big!

HOW TO FIGURE SALES POTENTIAL (*from page 26*)

for 1960. The figures would probably run 33 lbs., 4 lbs. and 3 lbs.

It is the average expenditure per acre that we are most interested in. It is a crude measure; the best that you can hope for is that it is fairly accurate and representative for your area. The more accurate the local figure, the better your forecast. It might be possible to get this figure for each county in some states. If so, this would be a big help in setting dealer potential. However, for an entire state, it might be just as useful to use the state average in setting potential as it would be to work out a county by county figure.

Now let us go back and review your own sales in tons and in the number of pounds per acre.

Review of Sales by Ions and Pounds Per Acre

Year	Tons	Pounds per Acre	Number Acres
1955	20,000	15	2,665,000
1956	20,000	20	2,000,000
1957	22,000	30	1,470,000
1958	24,000	32	1,500,000
1959	26,000	37	1,405,000
1960 (estimated)			1,450,000

Up until now the figures looked pretty cheerful, but this should take most of the joy out of them. Now the big question that should be asked, is what is your real sales potential?

If you were doing as well as you did in the beginning and serving the same number of acres, you would have a potential of 2,665,000 acres at about 37 pounds or more per acre and tonnage sales of 39,000 tons. From the chart, however, some competition seems to have moved in. This is the big advantage of using a composite figure such as a state or county average. It will be somewhat inaccurate, but it will give you a better measure in terms of one value such as acres.

THE POUNDS PER ACRE APPROACH

Now in most retailing the composite of average sales per capita is used. Since fertilizer is based more on acres of land than on number of farmers, I thought it best to illustrate the pounds per acre approach.

Let me repeat, these figures are fictitious, but they serve to illustrate the point, and I will continue to use them.

For sake of illustration, let us say that in your entire territory there are 12,000,000 acres of land, Does this constitute your potential? No, it does not. for in the first place no one can get all the business. You *can* figure your proportionate share. In the case we have illustrated here, you don't need a marketing man to tell you that you have been steadily losing out. There might be cases where you would want to measure this so let us look at the figures this way:

Percentage Share of Territory

Year	Total Acres in Territory	Our Share	Percent
1955	12,000,000	2,665,000	22.1
1956	12,000,000	2,000,000	16.7
1957	12,000,000	1,470,000	12.2
1958	12,000,000	1,500,000	12.5
1959	12,000,000	1,405,000	11.7
1960			

With all these figures down in black and white, we can make several predictions for next year's business. We can take the figures from Table I and predict an increase of 7% in tonnage which would bring us out with a potential of about 27,830 tons. We could take the number of acres which we handled last year, shown in Table III, multiply it by a new projected pounds per acre figure of say 40 lbs. and wind up with about the same 28,000 tons. Again, we could figure the entire territory at the new figure: 12,000,000 acres, times 40 lbs. per acre, times 12% and come up with about 28,000 tons.

Of all the methods of measuring sales potential for purposes of comparison and evaluation of an individual business's health and progress, I have a marked weakness for the pounds per acre combined figure which would then be divided into my own company's sales. I am as willing to admit its weaknesses as anyone, but nearly any good marketing man can find a pounds per acre figure that is fair and reasonable for his own territory. This figure can, if kept in terms of units, provide a very good measuring stick, since many variables are combined in it, that would otherwise be very hard to control.

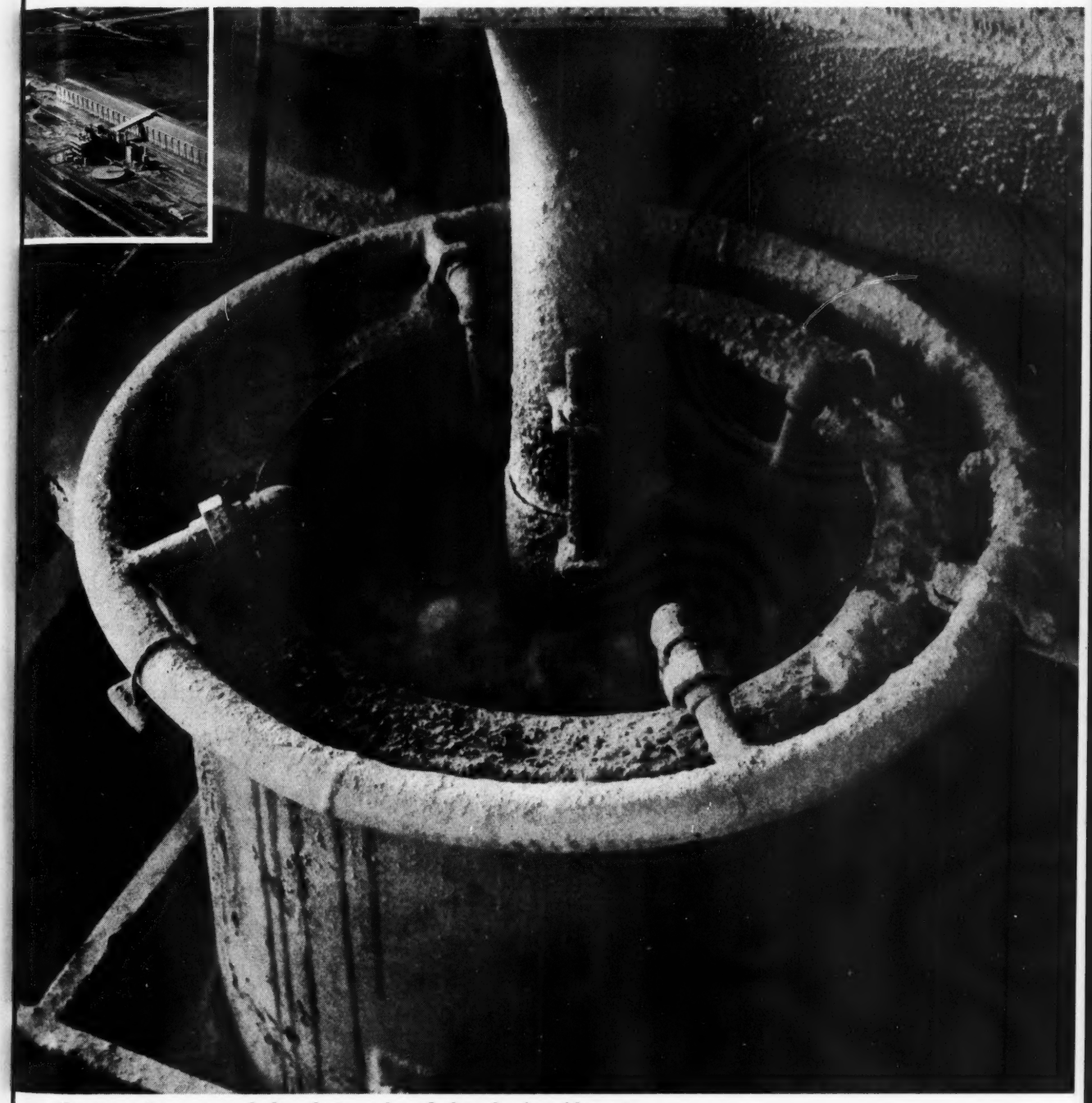
IT CAN SERVE AS A WARNING

Now the biggest thing that a sales potential chart can do is *not* to set sales potential alone, but warn you if you are losing ground in an area. Once this is done it is up to the executives to try to remedy this problem. You can, by extensions and extrapolating data, go as far as you want in predicting future needs. But any extrapolating that is done in this fashion is rather dangerous since you are never sure until the time is up whether the logistic growth curve, the straight line linear regression, or the logarithmic straight line would have been the best predictor.

For next year's business and the measurement of past and present performance, the sales potential estimate is a worthy tool. Don't try to be facetiously accurate. We might have put every figure on these charts on a calculating machine and carried them out to the fourth decimal. However, this sort of accuracy is foolish in such computations. Figures rounded to even thousands or even millions are accurate enough and far easier to work with.

As you work with these methods of deriving a sales potential, you will learn which one is most adaptable to your situation. That is the one to use; one that would be difficult will be too soon abandoned and a valuable tool of business lost. ▲

IT ALL COMES DOWN TO THIS CRITICAL POINT



... the core where ground phosphate rock and phosphoric acid meet to make Trebo-Phos*, the triple superphosphate with controlled porosity for proper ammoniation. American Cyanamid Company, Agricultural Division, New York 20, New York. **Trebo-Phos is American Cyanamid Company's trademark for its triple superphosphate.*

CYANAMID

TREBO-PHOS

TRIPLE SUPERPHOSPHATE

CYANAMID SERVES THE MAN WHO MAKES A BUSINESS OF AGRICULTURE

NAC's president emphasizes the need

Drive Home

face

Cover personality from last issue of this magazine, Dan Anderson of Allied Chemical Corporation, displays "magic" at the NAC Banquet. Note letters "NAC French Lick". He came up with this pattern after tearing bits from folded newspaper.

AT THE PRESENT TIME there is no more burning question being asked by National Agricultural Chemicals Association members than "How will we regain those old friends of the industry who have been swayed by the malicious attacks on agricultural pesticides by minority groups?" This problem was perhaps the hottest item on the agenda of the NAC's 26th annual meeting October 21–23 at French Lick, Indiana.

Re-elected president of the association for a third consecutive term, Jack V. Vernon, vice president of Food Machinery and Chemical Corporation, New York, N. Y., declared in the opening address:

"American agriculture and the public generally are being seriously harmed by the unwarranted attacks on agricultural pesticides by some wildlife groups, conservation groups, organic farmers and various other faddists."

Speaking before more than 350 members of the pesticide industry, Vernon stated that when spokesmen and publicists for these critics "enter the field of agricultural pesticides too often they substitute zeal for judgment and noise for knowledge."

We must "move positively to drive home the truth" about the importance of pesticide chemicals to the American public, said Vernon, for unless we do "we face undue restrictions on the manufacture, distribution, sale and application of our products. This would be harmful not alone to the industry, but also to American agriculture and to the public generally."

NAC MAKING STRONG EFFORTS

Vernon was emphatic in his statement that the NAC "has made sincere efforts to develop among the wildlife people a better understanding of industry's

Left: Dr. Charles E. Palm, dean of College of Agriculture, Cornell University, discussed "World Pest Control Problems." **Center:** Charles H. Sommer, executive vice president, Monsanto Chemical Company, presided over convention events. **Right:** Baffling his audience with his grasp for agricultural statistics, keen wit, and sincerity Dr. Earl L. Butz, dean of the School of Agriculture, Purdue, talked on "Agriculture in the National Economy."

Pesticide Truths

face undue restrictions which would be harmful to industry, agriculture and the public.

responsibilities, and the vital role its products play in our total economy, and in advancing public health."

He added that the NAC has also agreed with the wildlife people that more research is desirable "to determine in greater measure the effects of pesticides on wildlife." However, he went on, "attacks of some of the wildlife groups continue unabated."

The NAC gave one of its chief critics—the National Wildlife Federation—the floor at the convention the same morning that Vernon's address was delivered when a panel discussion of Pesticides and Wildlife again came into the spotlight. It was expected that its conservation director, Charles H. Callison, would launch a "blast" against the much discussed fire ant program of the USDA. But it was his fiery references to "scientists and bureaucrats" which produced the most raised eyebrows among other members of the panel and the audience.

"The bureaucrat or the single-track scientist who thinks he can write off a kill of wildlife caused by an insecticide as a matter of no importance, is making a grave political mistake. This has been lately demonstrated by refusal of the Alabama legislature to appropriate any funds this year for the fire-ant program," Callison declared.

He went into detail on their inability to "confess error," adding "that the other human weakness contributing to the fire ant brawl has been the demoralizing spectacle of the practitioners of one branch of science attempting to discredit and even ridicule the findings of a kindred branch."

If Callison's remarks influenced the entomologist on the panel—Dr. Charles Lincoln, head of the department of entomology at the University of Arkansas—it wasn't noticeable to the audience. The gist of his remarks were:

"What's all the fuss? Hunting and fishing on the Delta is as good as ever."

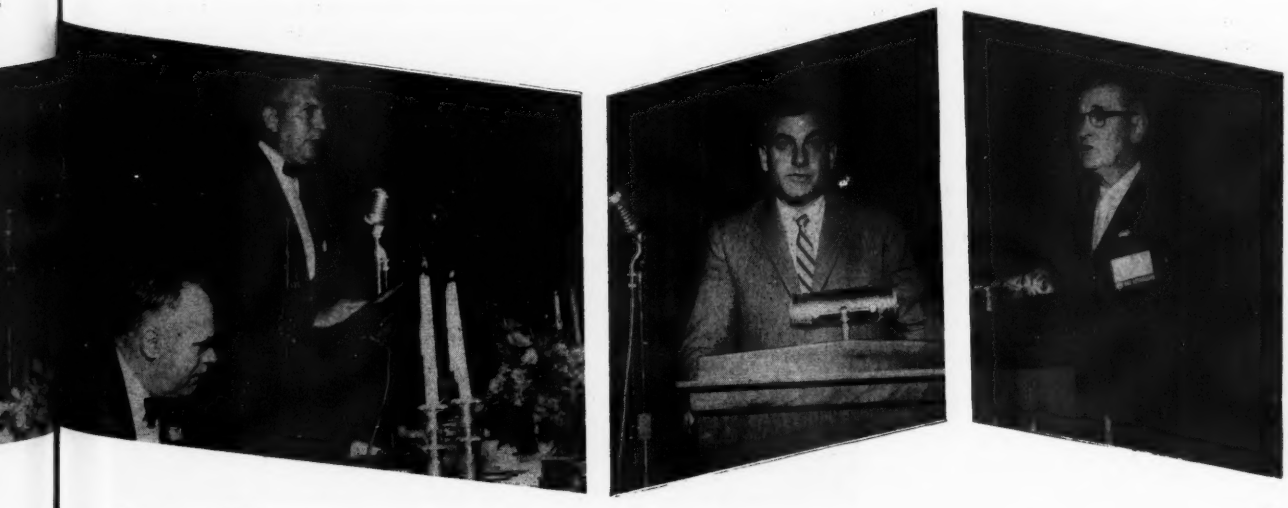
Evidently an ardent sportsman, Lincoln said that "the delta continues to afford excellent hunting of quail, dove, duck, rabbit, squirrel, and deer. I can personally attest to this. Death losses of game birds and animals are rarely reported."

He reported that cotton fields in the delta area in Arkansas have been subjected to heavy treatment with insecticides for several years. There has been practically no effect on the overall fauna."

Walter W. Dykstra, staff research assistant, Branch of Wildlife Research, U. S. Fish and Wildlife Service, brought out the position of the Service in this controversy. He said that it does not oppose or become involved in pest control operations except as they impinge upon its responsibility for the protection of fish and wildlife resources. He added:

"It (the Service) believes that the measures adopted for such control should be those which entail least danger to all forms of life other than the specific pest toward which control is directed. It solicits the assistance and cooperation of the chemical industry in accomplishing this objective."

Dykstra said that the current budget of the Fish



Left: Winners of the golf tournament were announced at the NAC Banquet by Harrold B. Jones, American Smelting and Refining Company. **Center:** One of the outstanding addresses was delivered by Robert S. Thompson, president of Thompson-Hayward Chemical Co., Kansas City. Title: "Sales and Marketing of Pesticides." **Right:** Re-elected for his third straight term as president of NAC, Jack V. Vernon, vice president of Food Machinery and Chemical Corporation, New York, addresses the 26th Annual Meeting.

New Vice President, Dr. George R. Ferguson, (right) president of Geigy Agricultural Chemicals, Division of Geigy Chemical Corporation, Yonkers, N. Y., gets a "briefing" from an old pro in NAC business matters, Jack Vernon.

and Wildlife Service contains an appropriation item of $280,000 for research studies on the effects of pesticides upon fish and wildlife resources.

In other legislation (P. L. 86-279) signed by the President on September 16, 1959, the Service was granted authorization to expend $2,565,000 annually for such investigation. However, no additional appropriations were made for expansion of research above the $280,000 level during the present fiscal year.

Defending the use of insecticides as having "played a leading role in bringing about better living, through the control of insects that threaten our possessions or transmit debilitating or deadly diseases to man and domestic animals", was C. H. Hoffmann, entomology research division, Agricultural Research Service, USDA. Concerning the insecticide-wildlife controversy, he said:

"This matter of insecticide damage to wildlife is of great importance to all of us and merits continued close examination. I am sure, however, that many of the claims could not be substantiated. Some were based on animal kills in areas that had been sprayed, but there was no definite proof of insecticides being the cause. Others were based on kills in experimental areas purposely treated at dosages greater than those required or recommended for insect control."

He added that "entomologists, representatives of the agricultural chemical industry, and users of insecticides have been disturbed by the many scare stories that have been released with the hope of arousing the public to stop the general use of insecticides or specific control or eradication programs, including those decreed by the Congress."

Hoffmann said, "I doubt that persons making such claims have complete knowledge of the research that precedes most programs and of the many factors considered before new insecticides are recommended for public use or large-scale pest-control programs are undertaken."

"Because of lack of funds and priority of other assignments," he continued, "there has been a paucity of research information developed by fish and wildlife specialists on the effects of different insecticides on wildlife. In fact, it has sometimes been necessary for entomologists to make studies of the effects of new insecticides on fish as a safeguard prior to making recommendations for insect control."

Hoffmann expressed concern that this situation should be corrected soon and that "additional cooperative studies can be undertaken by entomologists, fishery biologists, and other wildlife specialists to arrive at sound procedures for effective control with a minimum of damage to wildlife."

He admitted that "it may be that research scientists, pest-control officials, administrators, and the insecticide industry have been negligent or ineffective in their public relations work to keep citizens informed on the necessity for use of insecticides and other agricultural chemicals." He brought out that a special effort should be made to get across the aims of these programs in all sorts of informational media in order to reach all individuals who may be affected or have an overall interest in them.

"The chemical industry should assume a more prominent role in arranging for . . . investigations or underwriting some of the studies undertaken by agencies fitted to make them. There are important gaps in information on the many worthwhile insecticides that have become available since DDT. Let's conduct intensive research on all these materials so that they can be used as needed with a minimum of hazard to higher animals," he concluded.

BUTZ EXPLAINED "NEW AGRICULTURE"

Earl L. Butz, dean of the School of Agriculture at Purdue University, told a luncheon session that "agriculture is changing from a way of living to a way of *making* a living.

"It is changing from a business of arts and crafts to a business undergirded with large amounts of science and technology."

He explained that the present agricultural revolution, resting on basic science and closely allied with the widespread advance of automation in both production and distribution "is threatening the tradi-

Enjoining the NAC Banquet were (left to right): Mrs. I. W. Bales; Blanchard Smith, Chipman Chemical Co., Bound Brook, N. J.; Mrs. George Pierce; I. W. Bales, Chipman Chemical Co.; Mrs. Blanchard Smith; George Pierce, Moyer Chemical Co., San Jose, Calif.

tional pattern of owner-manager-operator in a single person. This is the very basis of much of today's social and political unrest in agriculture."

FORMULATOR-DISTRIBUTOR IS THE "KEY"

"During the past several years there may have been a further trend away from formulators and basic distributors and to the handling of more sales by direct representatives, at least by some national or integrated companies," Robert S. Thompson, president of Thompson-Hayward Chemical Company of Kansas City, reminded NAC members. However, he said that "I, for one, feel that this trend has moved too fast and too far without fully analyzing where such organizations fit into the marketing scheme."

He went on to say that in spite of this, sales through formulators-distributors have generally kept pace with total sales of pesticides.

"I do not believe that there is any area of the chemical industry where the strong local or regional organization fits better into the marketing scheme than in the distribution of agricultural chemicals," he added. "I believe that strong local formulator-distributors will always be able to give better service than their national and larger competitors."

He went on to attack consignment selling, saying that he does not believe basic manufacturers should sell their technical products and basic materials on a consignment or dating basis . . .

". . . because in doing so they are really weakening the formulator-distributor who is their key link in the distribution chain."

THE CASE FOR MORE ADVERTISING

Lou F. Czufin, manager of the advertising division of California Spray-Chemical Corp., really had his audience on the edge of their chairs as he showed them graphically (and with the aid of a pretty model) "how the agricultural chemical industry can increase sales and profits."

He brought out the fundamentals of advertising in selling pesticides, what the industry is spending on advertising and promotion of pesticides in relation to other industry programs (pretty weak!), and "what we should be doing."

He quoted Charles Mortimer, president of General Foods, who commented on his 96 million dollar advertising budget as follows:

"One thing our long experience has taught us is that the surest way to overspend on advertising is not to spend enough to do a job properly. It's like buying a ticket half way to Europe. You have spent some money, but you just haven't arrived."

New NAC directors are Paul Mayfield, vice president of Hercules Powder Company, Wilmington, Del.; John A. Field, vice president, marketing, Union Carbide Chemicals Company, New York; Herbert F. Tomasek, president, Chemagro Corporation, Kansas City, Missouri.

Discussing "World Pest Control Developments," Dr. Charles E. Palm, dean of the College of Agriculture, Cornell University, told his audience that the role of education is strengthening throughout the free world.

After observing the land grant college system, experimental stations, Extension Service, the Point IV program of technical assistance, the ICA, the FAO, and the Rockefeller and Ford Foundations in action—Palm said that there was a distinct rise in pesticide usage wherever he went.

He brought out that a major problem is labeling—getting the message on the package in the language which people overseas understand.

Joining Vernon on the executive staff of NAC as vice president was George R. Ferguson, president of Geigy Agricultural Chemicals, Division of Geigy Chemical Corporation, Yonkers, N. Y.

Three new members of the Board of Directors were elected. They were John A. Field, vice president, Marketing, Union Carbide Chemicals Company, New York, N. Y.; Paul Mayfield, vice president, Hercules Powder Company, Wilmington, Delaware, and Herbert F. Tomasek, president, Chemagro Corporation, Kansas City, Missouri.

Much deserved relaxation was finally a reality as the NAC Washington staff enjoyed the Banquet. The man who came to dinner—late—at far right is, of course, Denis Hayley, who actually got away from writing press releases. Left to right: Lea S. Hitchner, Robert Cochrane, Nancy Ford, Mrs. Jack Dreessen and her personable husband, all seem to agree with Denis that "Washington was never like this."

About 125 chemists from the fertilizer industry and state chemical laboratories gathered in Washington, D.C., last month for the annual conference on

CHEMICAL CONTROL PROBLEMS

IS UNIFORMITY really of value to the farmer? How can the chemical control laboratory eliminate errors in sampling and generally improve its methods? Should we have more or fewer samples—or should we spend more time on those registrants who have less-than-average performances?

These and many more questions were "attacked" at the annual Conference on Chemical Control Problems in Washington, D. C. last month. As usual, the conference was under the able chairmanship of Vincent Sauchelli, NPFI chemical technologist.

About 125 chemists from the fertilizer industry and state chemical laboratories were in attendance.

A simple method for evaluating a series of results from the chemical analysis of fertilizer samples was discussed by W. J. Youden, U. S. Bureau of Standards. The Magruder Fertilizer Check was the source of his data in illustrating his procedure.

HOW TO USE NEW MAGRUDER REPORTS

Edwin M. Glocker of W. R. Grace & Company Research Center, in discussing how to use the data from the Magruder Check Sample Statistical Analysis, explained:

"On the new series Magruder report sheet the published grand average of the results is essentially the same as the old average which appeared on the former Magruder reports. The present grand average is a refinement of the old average. Now each participant is represented by an equal number of analyses—two for each participant—whereas the former average was derived from whatever number of analyses each participant chose to make, average and report. The draw-backs of the former situation and the advantages of the present arrangement are well known to analysts who are familiar with modern statistical methods."

He explained that the new form of the Magruder report prompts queries from the participants of the check fertilizer sample program. The answers provided by the discussion are directed toward making the report as useful as possible to the participants, aiding them in evaluating their analytical accuracy and precision.

The following table lists situations which may arise and the course of action which should be taken in each case.

POSSIBLE SITUATION	COURSE OF ACTION
Average within one standard deviation of grand average, and range at least as small as average range.	No action required
Average outside of two standard deviations from grand average, but range at least as small as average range.	Look for cause of bias. No action on precision is necessary.
Average within one standard deviation of the grand average, but range greater than two standard deviations from the average range.	Look for cause of lack of precision. Suspect existence of bias.
Average outside of two standard deviations from grand average, and range greater than two standard deviations from the average range.	Look for cause of bias *and* lack of precision.
Average or range (or both) outside of three standard deviations.	Correction of bias or imprecision (or both) urgently needed.

Tolerances allowed in Guaranteed Analyses by various states (1958) were explained by F. W. Quackenbush, state chemist and seed commissioner for Indiana.

TOLERANCES ALLOWED IN GUARANTEED ANALYSES BY VARIOUS STATES (1958)

Alabama	.....5% of Commercial Value.....
Arizona	..Graduated Scale—see footnote (1)..
Arkansas	3% of total guaranteed value or 10% of the guarantee in individual ingredient.
California	.25% 1.00% 0.5% For agricultural minerals—5% below guaranteed total
Colorado	5% of Guarantee 5% of Guarantee 5% of Guarantee
Connecticut	.10% .2% .2%
Delaware	.....Not Stated in Law.....
Georgia	10% of any plant food, 5% of Commercial Value.....
Idaho	...5% in one or more constituents...
Illinois	None None None
Indiana	.....Not Stated in Law.....
Iowa	.....Not Stated in Law.....
Kansas	.....Not Stated in Law.....
Kentucky	.25% .25% .25%
Louisiana	..Graduated Scale—see footnote (2)..

(Continued on page 39)

READER SERVICE

FREE INFORMATION to help you solve fertilizer, pesticide problems

Chemicals

326—UREA FACT SHEET

A four-page fact sheet on Mathieson urea has been published by Olin Mathieson Chemical Corp.'s Chemicals Div. The brochure shows the availability of Mathieson urea in the East through the North Claymont, Del. plant and points up major engineering improvements. The urea will be produced by SunOlin Chemical Co., jointly owned by Sun Oil Co. and Olin Mathieson. Start-up of the 73,000 ton per year capacity plant is scheduled for the spring of 1960. For your copy of the fact sheet

CIRCLE 326 ON SERVICE CARD

327—DOW PRODUCTS CATALOG

The 1959–60 edition of The Dow Chemical Co.'s general catalog is now available. This 44-page compilation, "Products of The Dow Chemical Co.," lists properties and uses of some 375 industrial, pharmaceutical and agricultural chemicals currently produced. Developmental items as well as established products are included. For your copy,

CIRCLE 327 ON SERVICE CARD

328—PENCO THIRAM TECHNICAL

Pennsalt Chemicals Technical Bulletin A-15 covers Penco Thiram Technical. Composition, general characteristics, screen analysis, packages and general uses are given. A carbamate type fungicide in powder form, the product is used for production of various formulations for seed treatment, foliage application and turf diseases. For your copy of the technical bulletin,

CIRCLE 328 ON SERVICE CARD

329—HANDBOOK FOR FERTILIZER MIXERS

The Spensol Green Handbook, covering all phases of mixed fertilizer manufacture has been issued by Spencer Chemical Co. The 125-page book is third in a series of Spensol books which the company has published for use by mixed fertilizer manufacturers. Covering both granular and non-granular methods, the book includes formulas for production of all commercial analyses. In addition, basic tables useful in production calculations, plus illustrations of recent innovations in mixed fertilizer manufacturing, are included. For your copy,

CIRCLE 329 ON SERVICE CARD

330—TECH. BULLETIN ON NEW CONCENTRATE

A technical bulletin describing the new Fairfield Residual Concentrate No. 1 is available free to formulators, packagers and manufacturers of insecticides. The bulletin describes the concentrate—a combination of Pyrenone and malathion—and its properties as well as offering a sample label. Copies of the bulletin can be obtained by

CIRCLING 330 ON SERVICE CARD

331—FARM CHEMICALS CATALOG

Products of S. B. Penick & Company's Farm Chemical and Insecticide Div. are covered in a 40-page catalog available from the company. The company will be happy to send you a copy, if you

CIRCLE 331 ON SERVICE CARD

332—DIXOL NITROGEN SOLUTIONS BOOKLET

A new, convenient guide for the fertilizer production man, on Dixol Nitrogen Solutions, has been published by Commercial Solvents Corp. Included in the booklet are sections on types and uses of nitrogen solutions; ammoniation of superphosphates; ammoniation practice; granulation; formulation; storage of finished fertilizer; shipping, handling and storage of Dixol nitrogen solutions; safety precautions, first-aid measures and reference tables. For your copy

CIRCLE 332 ON SERVICE CARD

Process Equipment

333—FLEXIDYNE

If you ever encounter difficult mixing problems—including high inertia starts or sudden overloads—Dodge Mfg. Co. believes you will be interested in reading its "Flexidyne" booklet. Flexidyne is a dry fluid drive. The booklet describes practical problems solved by Flexidyne, includes charts for selecting size. For your copy of the 24-page booklet,

CIRCLE 333 ON SERVICE CARD

334—AMINCO BULLETIN

A twelve page bulletin describing a new line of high-pressure pipe-size valves and fittings now is available from the American Instrument Co. These valves and fittings are equipped with lens-ring gaskets and union-type joints. Lens-ring gasket is self-energizing with a pressure seal that tightens as internal pressure increases. Aminco says the line has wide application in the chemical processing field. The two-color bulletin describes the preparation of these joints and lists the company's complete line of lens-ring gasket valves; connectors; elbows, tees and cross-type fittings; as well as special purpose fittings and socket weld fittings. The bulletin will be sent to you free of charge, if you

CIRCLE 334 ON SERVICE CARD

335—REINFORCED PLASTICS

INDUST, the reinforced plastics division of Industrial Sheet Metal Works, has published a brochure covering the applications and advantages of their reinforced fiberglass plastics in designing corrosion resistant industrial fume and dust control systems. The brochure deals with physical characteristics of reinforced plastics. Ducts, hoods, stacks and other applications of reinforced plastics are illustrated. To receive a copy

CIRCLE 335 ON SERVICE CARD

336—NEW ELECTRONIC SOLUTION CONTROLLER

Electro Mechanisms Corp. reports that its electronic solution controller system controls concentration of caustic, acidic or aqueous solutions. In operation, whenever the level of concentrated solution in the holding tank falls below a preset point, the pump is automatically actuated and sprays a wash solution on the dry compound, or liquid concentrate, until the wash tank concentrate is again at the desired concentration level. For full information,

CIRCLE 336 ON SERVICE CARD

337—EQUIPMENT CATALOG

Availability of a new 8-page catalog describing and illustrating its line of chemical process and heat exchange equipment has been announced by Manning & Lewis Engineering Co. The catalog also describes the company's organization and facilities and presents a representative showing of heat transfer equipment, reactors, mixers, kettles and special process machinery manufactured by Manning & Lewis. Copies are available by

CIRCLING 337 ON SERVICE CARD

Materials Handling

338—WAREHOUSE LAYOUT

"Warehouse Layout: Narrow Aisles or Wide?" is discussed in an eight-page brochure published by Automatic Transpor-

how to use the READER SERVICE CARD

- *Circle number of literature you want*
- *Print or type your name, position, company and address*
- *Clip and mail the Service Card*

See pages 54 and 55 for information on these Reader Service numbers:

350—Sturtevant Mill Co.'s Four-Way Fertilizer Mixer

351—Continental Can Co.'s New Plastic "Flip Cap"

352—New TractoLoader with Two Types of Transmission

tation Co. The history of the narrow aisle-wide aisle problem is discussed along with the changes and advances that have been made through the introduction of new materials handling equipment. There are four pages showing Automatic equipment in operation. Additional booklets are listed. Copies are available by

CIRCLING 338 ON SERVICE CARD

339—VIBRATING CONVEYOR CATALOG

Designed for highspeed conveying of most bulk materials, Syntron Co.'s mechanical vibrating conveyors are described in a new four-page catalog section. Complete descriptions, data and specifications for seven models are included. In addition to conveying, the vibrating conveyors can be used for preheating, drying, or cooling bulk materials with heated, stepped or water cooled troughs. A free copy of the catalog section will be sent to you, if you

CIRCLE 339 ON SERVICE CARD

340—YALE'S NEW LIFT TRUCK LINE

Yale Materials Handling Div. reports that its new line of LP-Gas and gasoline powered industrial lift trucks feature design advances in power transmission, mast construction, compactness of size, operating speeds, stability and maintenance. It is being introduced in 3000, 4000 and 5000 pound capacity models in both cushion and pneumatic tire types. Full information on the line is available by

CIRCLING 340 ON SERVICE CARD

341—AUTOMATIC WEIGHING SYSTEMS

Automatic measurement and control of bulk materials through unitized weighing systems of pre-engineered components is the subject of a bulletin issued by Weighing and Control Components, Inc. The instrumental technique of automatic weighing is described in terms of its basic components. Overall control capability of W-C weighing systems is graphically shown in an illustrated chart of the major components. A page is devoted to typical automatic process control applications. Copies of the bulletin are available by

CIRCLING 341 ON SERVICE CARD

342—NEW POWER-CURVE LOADERS

A new conveying surface said to have at least three times the service life of previous materials has been announced by Power-Curve Conveyor Co. for its 1960 model car loaders and bag conveyors. The conveyors use spring steel belts to permit a continuous bag conveying surface which can be swung to right or left for high speed loading of box cars and trucks and other bag conveying service. A change in steel analysis and spring manufacturing technique is now used. The manufacturer reports that with a Power-Curve Loader installation, one man can load without aid at least two box cars an hour. For details,

CIRCLE 342 ON SERVICE CARD

Application Equipment

343—PIPER PAWNEE

Designed specifically for the aerial application of chemicals, the Piper Pawnee is now in full production at Piper Aircraft Corp.'s Lock Haven, Pa., plant. Designated the Model PA-25, the Pawnee is a low-wing, 150 hp airplane. It has a useful load of 1,100 pounds, hopper capacity of 150 gallons or 20 cubic feet. Hopper tank is constructed of polyester plastic reinforced with fiber glass. Power plant package is the same as the Piper PA-22; landing gear is similar to that of the Piper Pacer. Tri-Pacer axles, Comanche wheels and brakes, and Apache tires are used. For complete information

CIRCLE 343 ON SERVICE CARD

344—SPREADER WITH SINGLE OR DOUBLE SPINNERS

The Challenger, a PTO driven, lime and fertilizer spreader, is available with single spinner and 18" conveyor or double spinners and a 24" conveyor, reports Highway Equipment Co. The Challenger is a positive feed, self-unloading spreader. Conveyor and spinner system operates off the PTO. Body capacities range from 4.6 cu. yd. on the 9' single spinner body to 8.8 cu. yd. on the 15' double spinner model. Literature and complete specifications are available. Just

CIRCLE 344 ON SERVICE CARD

345—AMMONIA HOSE

Two constructions of agricultural ammonia transport hose are available from Raybestos-Manhattan, Inc., both designed to withstand working pressures to 300 psi and to meet state safety regulations for the use of anhydrous ammonia. Paranite BW ammonia hose is heavy duty, braided wire construction for loading storage tanks, trucks and tractors. Homoflex ammonia hose is a braided ply construction for filling tractors and for feed lines. The company also offers Manhattan ammonia applicator hose for soil applicators to carry the anhydrous ammonia to the tip of the tractor applicator. A catalog is available by

CIRCLING 345 ON SERVICE CARD

346—CONTROL VALVE AND SELECTOR FOR RIGS

Latest Spraying Systems development for farm spraying is the DirectoValve. All parts that are touched by chemicals are made of either nylon or stainless steel, providing maximum possible corrosion resistance to all farm chemicals and fertilizer solutions, Spraying Systems Co. reports. The valves are supplied in one, two, three or four outlet port designs. One feature of the valve is that it provides a by-pass when closed, to protect hose lines, fittings and pump from effects of excessive pressure build-ups. The liquid continues to flow through the valve to the return line when the valve is closed. A bulletin giving complete information is available. Just

CIRCLE 346 ON SERVICE CARD

Miscellaneous

347—SELF-UNLOADING TRANSPORT

Dorsey Trailers reports that whatever your dry cargo may be, its new Bulkmaster self-unloading transport is engineered to cut delivery time and costs. Among its features: tandem hydraulic pump, powered by 25 hp air-cooled gasoline engine, operates rubber belt conveyor which is riveted to a 36" heavy-duty steel conveyor chain, and elevators. The unit pit dumps or can be equipped with 14-foot folding or rigid full-swiveling 18"-wide endless-belt conveyor. Discharge is reported to be in excess of a ton per minute. For literature

CIRCLE 347 ON SERVICE CARD

348—SERVICES & PRODUCTS CATALOG

"General American Services & Products for the Process Industries" is the title of a 20-page catalog from General American Transportation Corp. It describes and pictures GATX tank cars, Airslide cars, Dry-Flo Cars, custom fabrication, field erection, tank storage terminals, mixing devices and Louisville dryers. The section on dryers contains a selector table which lists a variety of materials, including DDT, diammonium phosphate, fertilizers, phosphates, potash, and 2,4-D powder. For your copy just

CIRCLE 348 ON SERVICE CARD

349—CONSTRUCTION MATERIALS FOR FERTILIZER PLANTS

"Materials of Construction for Fertilizer Plants and Phosphoric Acid Service" is the title of a 54-page booklet available from Chemical Construction Corp. Written by E. Pelitti, the booklet covers ferrous metals and alloys, non-ferrous metals, elastomers, plastics and miscellaneous materials. There are nine tables. They show corrosion rates of stainless steel 316 in phosphoric acid; relative cost of different metals as plate and pipe; corrosion rates of various metals in wet process phosphoric acid, in fumes from superphosphate den, and in electric furnace phosphoric acid. To obtain your free copy

CIRCLE 349 ON SERVICE CARD

CONFERENCE ON CHEMICAL CONTROL PROBLEMS

(Continued from page 36)

State	Nitrogen	Phosphoric Acid	Potash
Maine	Not Stated in Law		
Maryland	Not Stated in Law		
Massachusetts	Not Stated in Law		
Michigan	Not Stated in Law		
Minnesota	Not Stated in Law		
Mississippi	4% of Commercial Value		
Missouri	Not Stated in Law		
Montana	Not Stated in Law		
Nebraska	Not Stated in Law		
Nevada	Graduated Scale—see footnote (1)		
New Jersey	Not Stated in Law		
New Mexico	1/15 of Guarantee	1/15 of Guarantee	1/15 of Guarantee
New York	Not Stated in Law		
North Carolina	Graduated Scale—see footnote (1)		
North Dakota	Not Stated in Law		
Oklahoma	Not Stated in Law		
Oregon	Not Stated in Law		
Pennsylvania	Graduated Scale—see footnote (1)		
Rhode Island	Not Stated in Law		
South Carolina	Graduated Scale—see footnote (3)		
South Dakota	Not Stated in Law		
Tennessee	3% of Guaranteed Commercial Value		
Texas	4% of Guaranteed Value		
Utah	5% of Guarantee for any constituent		
Vermont	Not Stated in Law		
Virginia	Graduated Scale—see footnote (4)		
Washington	Not Stated in Law		
West Virginia	Graduated Scale—see footnote (1)		
Wisconsin	Not Stated in Law		
Wyoming	Not Stated in Law		

	Nitrogen		Phosphoric Acid		Potash	
(1)	2%	.20	up to 10%	.40	2%	.20
	3%	.25	10–25%	.50	3%	.30
	4%	.35	Over 25%	.75	4%	.40
	5–8%	.40			4–8%	.50
	8–30%	.50			8–20%	.60
	Over 30%	.75			Over 20%	1.00
(2)	up to 8%	.40	up to 10%	.40	up to 8%	.50
	8–31%	.50	10–26%	.50	8–21%	.60
	Over 30%	.75	Over 25%	.75	Over 20%	1.00
(3)	3% or less	.30	up to 10%	.40	3%	.30
	4%	.35	10–25%	.50	4%	.40
	4–8%	.40	Over 25%	.75	4–8%	.50
	8–30%	.50			8–20%	.60
	Over 30%	.75			Over 20%	.75
(4)	3% or less	.30	up to 10%	.40	3% or less	.30
	4%	.35	10–25%	.50	4%	.40
	4–8%	.40	Over 25%	.75	4–8%	.50
	8–30%	.50			8–20%	.60
	Over 30%	.75			Over 20%	1.00

All of this data was obtained from information prepared by the National Plant Food Institute. (Summary of State Fertilizer Laws, etc., 1958.)

The Association of American Fertilizer Control Officials (Official Publication No. 12), in its proposed model uniform fertilizer law recommends the following tolerances:

Nitrogen		Phosphoric Acid		Potash	
2%	.20	10% or less	.20	2%	.20
3%	.25	11–25 incl.	.25	3%	.25
4%	.35	Over 25%	.35	4%	.35
5–8%	.40			5–8 incl.	.45
9–30 incl.	.50			9–20 incl.	.50
Above 30%	.75			Over 20%	.85

Robert Z. Rollins, chief, Bureau of Chemistry, State Department of Agriculture, California, told about the relation of the state regulatory office to the local fertilizer industry. He said that in California when a company has a poor record—4 or 5 deficiencies in a month—they encourage its management to "dig into the situation and investigate themselves."

"The percentage of deficiencies found in official samples of commercial fertilizers varied widely," he added, "and 18 per cent of the samples analyzed during 1958 failed to meet their guaranteed analysis within the tolerances prescribed by law. California tolerances are 0.25% nitrogen, 1.00% available phosphoric acid, and 0.50% potash."

He stressed the point that "there's nothing the industry needs more than a good law." He felt that in California they were fortunate in that respect.

THE CONTROL LAB: A 'DEFENSE UNIT'

Describing himself as "long range planner" for International Minerals and Chemical Corporation, Nelson White told the group that management recognizes the inefficiencies of over-formulation, as well as the penalties of deficiencies. He described the control laboratory as the "defense unit" of the company and should be one of the strongest links in the manufacturer's chain "connecting research, production and sales—acting as an extension of each and insuring a strong, safe bond to the customer."

He said that the control lab is there to protect the company's greatest asset—its reputation . . . its brand name.

Commenting on the general agricultural situation, he said that the farmer has moved to take advantage of every improvement at his disposal, including all types of expensive machinery and equipment, but he's still only using half enough plant food—at his own admission.

John Brabson of the Chemical Development Division, TVA, told the group that "an inferior analytical method is like an inferior house—as a whole it's easier to get a hold of it than to get rid of it."

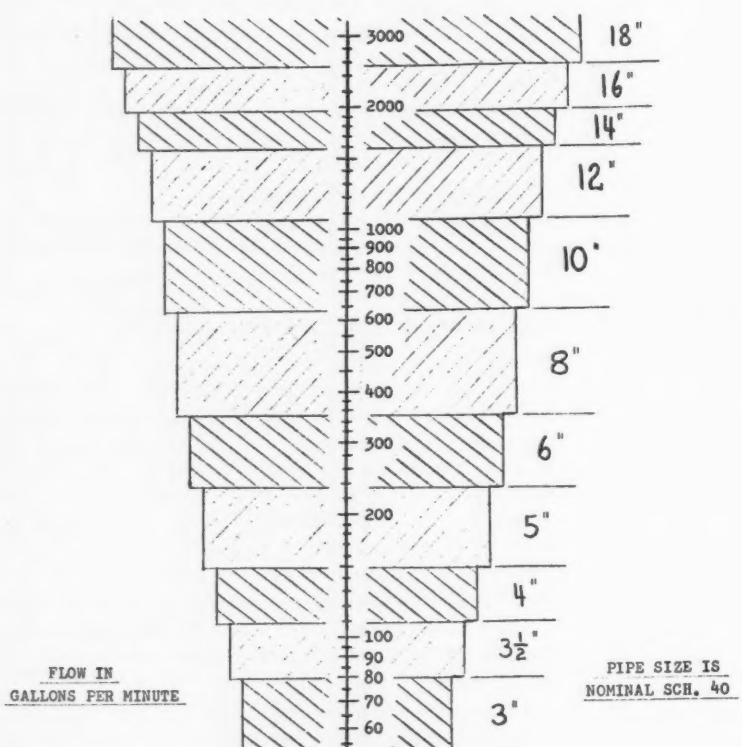
He pointed out that "our biggest errors are still in sampling and in execution of our methods." He added that the methods we used in 1916 are not good enough in 1959.

"We want our methods to rest on a firm foundation —and give our referees the quality and counsel they need." ▲

ECONOMIC PIPE SIZE

Proven out experimentally, this graph will ease the job of picking the right pipe by giv

By J. G. LOWENSTEIN
Professional Engineer
Food Machinery and Chemical Corporation,
Chemical Divisions, New York City



THE SIZING of pipe for the transport of water is usually a rather random procedure, even though the consequences of incorrect sizing can be costly.

If the chosen pipe size is too large, then the cost of pipe and fittings becomes a major expense factor, whereas when the pipe is too small, bigger pumps are required and increased pumping costs are incurred because of the extra large pressure drop through the pipe.

KEEPING COSTS DOWN

In all applications involving the transport of water, and especially in mobile irrigation systems and related piping systems, it is of paramount interest to keep equipment costs down: pumps, pipe and fittings should all be adequately sized to do the job, i.e. deliver a given quantity per unit time at the least possible cost. It must now be remembered that because of relatively long pipe-runs, pressure drop in the system can become critical, and pipe must therefore be sized to deliver the maximum amount of water with an optimum pressure drop at a minimum capital and operating cost.

The accompanying chart is set up to give the most economic pipe size directly for any given flow of water. It is based on the theory that the functional cost of operating the pumping equipment is directly proportional to pipe size, while the functional cost of pipe and fittings, amortization, maintenance, and pump efficiency are inversely proportional to pipe diameter.

To use the chart, find the re-

y given flow of water

quired flow rate, in gallons per minute (GPM) on the central vertical scale, and read pipe size directly to the right of the adjacent cross-hatched section.

For example, desired flow rate is 100 GPM, therefore *3½ inch* pipe is called for. If the flow is 500 GPM, then the most economic pipe size is *8 inches*, and so on.

Conversely, for example, the maximum quantity of water that a 6 inch pipe can deliver economically is *350* gallons per minute, while the minimum quantity is *240* GPM (as read at the top and bottom, respectively, of the 6 inch section). The key word here, of course, is ECONOMIC! (It should be noted that the chart reads directly for nominal schedule 40 standard weight pipe.)

Thus the chart instantly tells economic pipe size for a given flow of water, or conversely, gives the maximum and minimum amounts of water which any pipe will deliver most economically.

USING THIN WALL PIPE

For low pressure work—below 500 pounds per square inch—it is usually advisable to go to thin wall pipe, not only for reduced cost, but also for reduced weight. Aluminum and plastic pipe have come into wide usage, and their weight vs. cost factors must be established. A cost factor table is given below, with mild steel pipe being the standard at 1.0:

Mild Steel	1.00
Cast Iron	.95
Galvanized Steel	1.20
304 Stainless Steel	9.12
Aluminum (3003-F)	1.19
Polyethylene	.85–1.31
Polyvinylchloride	1.96
Transite	.95
Epoxy Glass	3.28

(Reference: "Chemical Engineering", March 23, 1959, p. 157.)

The economic pipe diameter chart can of course be used for *any* pipe, but some allowance should be made for thin wall pipe. For example, should the flow be 35 gallons per minute, 2½ inch schedule 40 pipe is called for. However, if light-weight thin wall aluminum pipe is being used, the 2 inch size will be sufficient. Thus it can be seen that in many cases a smaller diameter can be used by going to thin wall pipe. The choice of proper and economic pipe size then becomes a balance between cost per foot of pipe, weight per foot of pipe, and the proper diameter for allowing minimum pumping costs. ▲

HOW CAN THE PESTICIDE INDUSTRY INCREASE SALES AND PROFITS?

(Continued from page 24)

turers are successfully convincing these farmers of the extra profits that are made from using these products.

Yes, we are in a pioneering stage in our business and don't think it's only the small farmer who is ignoring the use of insecticides, fungicides, weed killers, and seed treaters.

A recent study made on a large scale farmer in Pennsylvania indicates that he has 2,256 acres; he has 22 men to do the field work; he raises poultry, hogs, beef cattle, produces milk, eggs; he raises much of his own feed and he has his own feed mill.

This grower was interviewed and a "shopping list" of what he will buy for 1960 was developed. He will buy, for example, 25,000 gallons of gasoline; 13 tractors, combines, cultivators, barn cleaners; 200 tons of fertilizer, 3 tons of salt and minerals. He will buy antibiotics, seed, pipe, pumps, trucks and incidentally 100 tires. Nowhere on this list do we see a mention of anticipated purchases of pesticides of any kind. Here we feel is a striking example of the need for our industry to develop the market and the potential. We must think of advertising and promotion expenditures in terms of cultivating the market and spending *market development dollars*. Until our business falls into the "accepted practice" category, we must spend advertising money not only to sell but also to educate.

For the third and last point, I would like to touch upon some of the advertising and sales promotion techniques and devices which have worked so well for many successful marketers and which we should examine carefully in connection with our problems.

Consider this a check list—are we making full use of these sales tools: farm television, radio, state farm papers, regional farm papers, national farm magazines, local newspapers, horticultural publications, specialized trade publications, displays, counter cards, window streamers, posters, literature, and booklets?

In the area of sales promotion, are we working with these sales development tools: Motion Pictures for use with your trade and with your farm customers, Incentive Contests, Trade Shows, Horticultural Programs, Organized Presentation Kits for your salesmen?

In summary, I have tried to point out the role of advertising in our industry; the urgent need for development budgets on advertising and promotion and an indication of some of the tools that you may wish to consider in the development of your own program.

I would like to close by quoting from Charles Mortimer, president of General Foods. Mr. Mortimer in commenting on his 96 million dollar advertising budget said: "*One thing our long experience has taught us is that the surest way to overspend on advertising is not to spend enough to do a job properly. It's like buying a ticket half way to Europe. You have spent some money, but you just haven't arrived.*"

And I might add, "Fellows, it's a helluva long swim home!" ▲

TECHNICAL REVIEW

RESEARCH PROGRESS on

INSECT RESISTANCE

Over 200 technical and scientific personnel from the federal government, state colleges, research organizations and the pesticide industry attended the symposium sponsored by a committee of the National Agricultural Chemicals Association and the Entomological Society of America at the Mayflower Hotel, October 7 and 8. Above, the audience listens attentively to Dr. A. W. A. Brown of the University of Western Ontario as he discusses "The Insecticide Resistance Problem in the W. H. O. Programs for Vector Control" during the luncheon.

THE farm chemicals industry teamed up with scientists from the federal government, state colleges and research organizations to conduct a Symposium on "Research Progress on Insect Resistance" at the Mayflower Hotel in Washington, D. C., October 7–8.

"Skilled in techniques of organic synthesis, the industry is in a good position to make substantial contributions to a solution of the insect resistance problem," J. E. Johnson of The Dow Chemical Company told the group in one of 23 papers presented at the symposium.

DIRECTION OF FUTURE RESEARCH

"The development of insect resistance to chemicals has cut across the lines of practically all classes of compounds, and has included arsenicals, cyanide, tartar emetic and lime sulfur as well as the newer chlorinated hydrocarbon and organic phosphate insecticides," reported George R. Ferguson, Geigy Agricultural Chemicals.

"The direction of future research in the chemical industry will probably continue along the lines of synthesis and development of new patentable compounds with special efforts directed toward new active chemical groupings. Under the stimulus of such problems as the subject of this symposium, research in tax-supported institutions will probably tend toward greater emphasis on basic biological research in such fields as insect physiology, biochemistry, genetics and ecology. The direction of chemical control of insects will undoubtedly tend toward more and more specific methods and treatments," Ferguson said.

STANDARDIZED TECHNIQUES NEEDED

Harold T. Reynolds, University of California, pointed out the "urgency and importance for established levels of insecticide resistance with standardized laboratory detection methods in agricultural arthropod pests.

"To date the available laboratory results show that most workers have relied to a large extent upon their ingenuity in devising techniques to establish resistance levels. Although the results in most cases have provided the necessary mortality curves from which the appropriate LC_{50} or LD_{50} or LT_{50}, etc., can be calculated for resistance and susceptible strains, it seems desirable—even essential—that techniques be standardized. Thus, other workers now and in the future would be provided with familiar and more helpful information as they would be working with similar methods. The results would provide a reference point

in the future when it is conceivable that unexposed strains cannot be found. Certainly the literature would not be cluttered with as many variations in techniques as there are reports."

Among the outstanding authorities intently following the proceedings was Dr. Paul Mueller, Geigy Chemical Corporation, Basle, Switzerland. Dr. Mueller was winner of the Nobel prize in medicine in 1948, for the discovery of DDT.

Following are some research reports presented at the symposium.

Resistance of Mites Attacking Citrus, by L. R. Jeppson, University of California, Riverside, California. Experiments indicate that 1) a wide variation exists in the rate mites develop resistance to each of the various acaricides; 2) mites may be resistant at only one stage of development or the susceptibility of the various stages may be markedly different; 3) cross resistance of related insecticides and/or acaricides exists but for citrus red mite it is more general with the organophosphorus compounds than with the chlorinated hydrocarbons. Demeton appeared to be particularly operative in developing mite resistance to related phosphates; 4) the rate of resistance development in alternating acaricide schedules varied with the combinations selected.

Status of Pesticide Resistance in Insects and Mites Attacking Orchard Crops, by E. H. Glass, New York State Agricultural Experiment Station, Geneva, N. Y. Resistant strains of thirteen insect and mite species are known to exist on six species of deciduous orchard trees in the United States. On apple the codling moth is almost universally resistant in some degree to lead arsenate. More recently this insect has become resistant to DDT and certain DDT related materials in at least some plantings in most of the major apple growing regions of the United States, Canada and Australia. The red-banded leaf roller has become resistant to TDE in many orchards in the eastern part of North America. On apple one species of leafhopper (*Erythroneura lawsonia Baker*) in Kentucky was found to be resistant to DDT in 1953 and another species in New York was discovered to be resistant to DDT and TDE in 1959. Most of the apple infesting mites have developed resistance to parathion, TEPP, malathion and other related acaricides wherever these materials have been used regularly in the spray program. The European red mite, Pacific mite, two-spotted spider mite, Mcdaniel mite and a Bryobia mite have been reported resistant to at least one of these materials in one or more states. The European red mite is also known to be resistant to ovex, Mitox and Fenson in a California apple planting. The latter species is also known to be resistant to parathion in certain pear, peach, plum and prune plantings. Similar experience is reported with phosphate resistance in mites on orchard crops in other parts of the world.

The cherry rust mite is reported resistant to some of the thiophosphates in Washington. In Washington and in Oregon the green peach aphid has developed resistance to parathion in peach plantings. The peach silver mite is also resistant to parathion and other related products in these same states.

In California parathion resistant strains of the walnut aphid have been found on walnut. Here also there are codling moths that appear to have developed a moderate degree of resistance to DDT.

Field entomologists have been successful in solving pest control problems created by the development of resistance primarily by employing chemically unrelated pesticides. In some orchards the practice of frequent changing from one pesticide to another as new and better materials became available has been observed to delay and perhaps prevent the development of resistance. Certain investigators are now suggesting planned rotation of orchard pesticides.

Some of the predisposing factors leading to the development of resistance among orchard pests are discussed in relation to the probability of resistance

Dr. Paul W. Oman, president of the Entomological Society of America; Fred W. Hatch, Monsanto Chemical Co. and chairman of the NAC Symposium Committee; and Dr. R. L. Metcalf, symposium chairman, talk over details of the program.

Dr. George R. Ferguson, Geigy Agricultural Chemicals; Dr. Hans Gysin, Geigy Chemical Corp. (Basle, Switzerland); Dr. Paul Mueller, discoverer of DDT; Dr. E. F. Knipling, USDA; Dr. A. W. A. Brown, University of Western Ontario.

developing in certain orchard insects not known to be resistant at this time.

Status of Insecticide Resistance in Insects Attacking Vegetable Crops, by R. K. Chapman, University of Wisconsin, Madison. Intensive treatment of vegetable crops with the organic insecticides has produced several instances of insect resistance to these materials. Similar treatment over much longer periods with inorganic insecticides, however, did not produce such resistance. Considering the large total number of vegetable pests, relatively few have developed insecticidal resistance but these resistant insects constitute the most pressing problems in vegetable insect control at the present time.

Vegetable pests, exclusive of the mites, which have developed a definite resistance to insecticides, include the following: imported cabbageworm, cabbage looper, diamondback moth, Colorado potato beetle, potato flea beetle, southern potato wireworm, Mexican bean beetle, onion maggot, onion thrips, lygus bugs, green peach aphid and melon aphid with a possibility of resistance in potato aphid, tomato hornworm, European corn borer, beet armyworm, southern garden leafhopper and garden symphylid.

The biology and habits of at least some of the resistant forms differ markedly from that of the non-resistant strains. Although the prediction of the development and spread of resistance is extremely difficult, it is believed that by a study of the biology, habits and insecticide control program being used that at least some educated guesses can be made in this respect.

The Impact of Insecticidal Resistance Upon the Use and Development of Insecticides for Cotton Pests, by H. G. Johnston, National Cotton Council, Memphis, Tennessee. By 1958 no less than 16 species of insects and spider mites attacking cotton were known to be resistant or strongly suspected. One or more of these resistant species are found in localized areas of 11 states from California to North Carolina. Nine species are known to be resistant to one or more insecticides. (List of species available)

The boll weevil, which showed a pronounced resistance to chlorinated hydrocarbons in 1955, is the most destructive pest of cotton in the U. S.—causing more than three-fourths of all insect losses. About 80 per cent of the total cotton acreage and more than 95 per cent of all cotton producers are involved. Cotton cannot be profitably produced in most areas where weevils occur without adequate control. Effective chemical control for boll weevils often intensifies population development and increases the chance of resistance of other pests. Resistant weevils are now found in seven states from Texas to North Carolina and suspected in two others.

USDA records of hibernating boll weevils at Tallulah, Louisiana show that since 1947 there has been a 105 per cent increase in the average number of weevils hibernating in the fall—but there has been an even greater increase of 207 per cent in the number of surviving weevils in the spring.

The increased population pressure and expanded use of insecticides for weevil control soon developed a rather high degree of resistance to five commonly used chlorinated hydrocarbons. Other chemicals are currently available that will control boll weevils—and other resistant species—but there is no assurance that any of these pests will not also develop resistance to them.

Status of Insecticide Resistance in Livestock Pests, by W. C. McDuffie, U. S. Department of Agriculture, Kerrville, Texas.

At present house flies, numerous species of mosquitoes, the brown dog tick, the cat flea, and goat lice have been found resistant to one or more classes of insecticides. Reports have indicated that the chlorinated hydrocarbon insecticides are not as effective as formerly, and resistance is suspected but not definitely proved in the stable fly, horn fly, and primary screwworm fly, cattle lice, and poultry mites. In foreign countries resistance has been confirmed in species of mosquitoes, the stable fly, the sheep strike and other blow flies, at least three species of fleas, and several species of ticks. Most of the resistant species can be controlled with organic-phosphorus insecticides, but several species of mosquitoes and the house fly have already become resistant to this class of insecticides.

The Insecticide Resistance Problem in the W.H.O. Programs for Vector Control, by A. W. A. Brown, head, Department of Zoology, University of Western Ontario, London, Canada. No less than 50 arthropod species of public health importance have developed resistance to the chlorinated-hydrocarbon or organophosphorus insecticides. The problem is most serious in the anopheline vectors of malaria, of which 16 have developed resistance to dieldrin, and 4 to DDT and dieldrin; resistance now covers more than 5 per cent of the world malaria eradication program. Resistance is of importance not only in the house fly, but also in the body louse, yellow-fever mosquito, tropical house mosquito, human flea, and the two species of bedbugs.

Biochemical Aspects of Resistance, by C. W. Kearns, University of Illinois, Urbana, Illinois. The means by which some of our modern insecticides produce intoxication is essentially unknown. This type of information becomes indispensible to studies on resistance when all of the obvious and easily approachable causes have been explored and discarded. Problems dealing with the mechanisms of action of some of our insecticides have proven difficult to solve. The failure to find a biochemical mechanism to account for their action has led many to the conclusion that their action is physical in nature, involving such things as the altered permeability of some intangible membrane which is not subject to experimentation. Ample evidence is available to show that many of these compounds are attacked by enzyme systems, and this seems to be sufficient cause to explore further the possibility that their effects may result from their direct effects on vital enzyme systems.

More research reports presented at the Symposium will appear in the December issue. ▲

PATENT REVIEWS

By Dr. Melvin Nord

MANUFACTURE OF FERTILIZER FROM WET-PROCESS PHOSPHORIC ACID AND AMMONIA

U. S. 2,891,856, issued June 23, 1959 to John G. Getsinger and Robert L. Haunschild, assigned in part to Tennessee Valley Authority, describes a process for the production of fertilizers from wet-process phosphoric acid and ammonia. When an attempt is made to crystallize diammonium phosphate from wet-process acid, a precipitate forms containing iron, aluminum, and calcium, and this precipitate causes eventual gelling of the entire solution. Moreover, this precipitate is in such physical form that it is extremely difficult to separate it from the solution by filtration, centrifuging, decanting, or other practical means. The present invention overcomes these difficulties by separating out these impurities as a precipitate, before the crystallization of diammonium phosphate.

In general the process, which is illustrated diagrammatically in Fig. 1, consists of introducing ammonia at a rate of less than 15 pounds of ammonia per hour per cubic foot of reactor volume into wet-process phosphoric acid having a concentration in the range from 20 to 28 per cent P_2O_5; heating the resulting liquor to boiling before the *p*H reaches a point where the rate of precipitation becomes rapid; and discontinuing introduction of ammonia when the *p*H of the liquor becomes 4.5 to 5.5, without strong agitation at any point in this process.

Five critical factors are involved in forming an easily separable precipitate containing substantially all the iron, alumina, and calcium contained in the wet-process acid. These critical factors are: (1) the concentration of the acid used; (2) the rate of introduction of ammonia; (3) the temperature at which rapid precipitation occurs; (4) the final *p*H of the acid solution; and (5) the absence of strong agitation.

After introduction of the acid to the ammoniation vessel 2, it is heated to boiling before rapid precipitation. Ammoniation is discontinued when the *p*H is 4.5–5.5. The ammoniated slurry is then passed to a rotary filter 7 without strong agitation, i. e. by gravity flow, rather than by a pump.

The filter cake (containing about 20% P_2O_5), washed by water sprays 14, is withdrawn to a vessel 8 equipped with a high-speed impeller, where it is liquefied by the agitation. The filtrate in line 9 can be made into a liquid fertilizer at 11 by the addition of suitable fertilizer salts at 13. Preferably, however, the filtrate is passed to a vacuum crystallization step via heater 15 and line 16. Streams of concentrated filtrate and ammonia are introduced via lines 16 and 21, respectively, into vacuum crystallizer 20. These streams are controlled to maintain the *p*H of the slurry in crystallizer 20 at about 6.0. The heat necessary may be supplied by the steam coils 22. Under these conditions, crystals of diammonium phosphate may be produced at high production rates without much loss of ammonia.

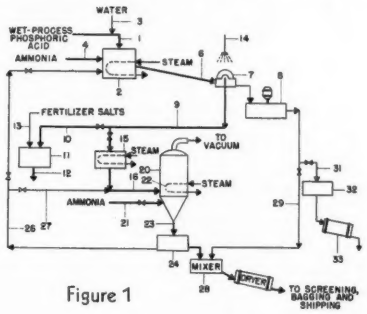


Figure 1

Crystals and accompanying mother liquor are withdrawn from the crystallizer via line 23 and passed to a centrifuge 24. Both the mother liquor and crystals are impure, since the original precipitation step and filtration do not remove all impurities derived from phosphate rock. As a result difficulties are encountered in making this separation. It has been found that these difficulties may be overcome by recycling a small portion, usually about one-tenth of the mother liquor, to the precipitation step via line 26. It is not necessary to recycle all mother liquor separated from the crystals to the precipitation step, but only enough to cause the crystal separation step to be easily operable. The remainder of the mother liquor is recycled to the vacuum crystallization step by line 27.

Crystalline diammonium phosphate, after separation from mother liquor in separation step 24, is fed to a mixer 28. Here it is mixed with liquefied filter cake introduced through line 29. The mixture is then dried and sized and is ready for use.

Alternatively, the diammonium phosphate may be passed on to the drying step without mixture of filter cake, and a product consisting only of fertilizer-grade diammonium phosphate is obtained. In this case the liquefied filter cake is passed via line 31 to an ammoniator 32 and is then dried and granulated in dryer 33. It is then ready for separate use.

PESTICIDES

U. S. 2,891,887, issued June 23, 1959 to Everett E. Gilbert, assigned to Allied Chemical Corp., discloses the use as active pesticidal toxicants, of dialkyl 1,3-di(carboalkoxy)-1-propen-2-yl phosphates and also methods of preparation of these compounds. They are used primarily for combatting insects and mites.

U. S. 2,891,984, issued June 23, 1959 to Karl Gatzi and Paul Muller, assigned to J. R. Geigy A. G., discloses the use, in the control of mites, of S-arylmercaptomethyl-O.O-dialkyl esters of dithiophosphoric acid.

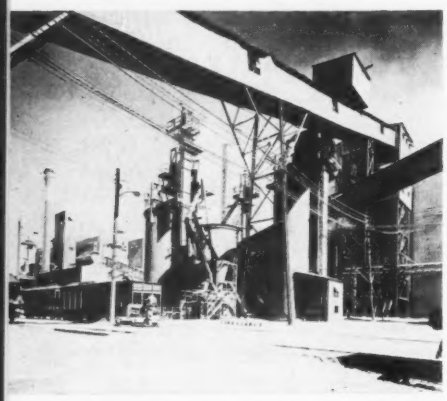
U. S. 2,893,911, issued July 7, 1959 to Maynard S. Raasch and assigned to E. I. du Pont de Nemours & Co., discloses the fungicidal properties of 1, 2-bis (alkylsulfoxy)-1,2-dihaloethylenes.

U. S. 2,894,015, issued July 7, 1959 to Glendon D. Kyker, assigned to Pennsalt Chemicals Corp., discloses the fungicidal properties of tetrakis (pentahalophenyl)-pyrophosphate.

U. S. 2,893,857, issued July 7, 1959 to David O. DePree, assigned to Ethyl Corp., discloses the herbicidal properties of triethyl-N-sec-butylaminolead. ▲

NEWS OF THE INDUSTRY

FMC EXPANDS PHOSPHORUS OUTPUT



The Mineral Products Division of Food Machinery and Chemical Corporation has announced a major expansion in production of their Pocatello, Idaho phosphorus plant.

R. F. Moran, manager of FMC's Mineral Products Div., noted that consumption of phosphorus-based chemicals for detergent and industrial use as well as for liquid fertilizers has been increasing and that FMC is expanding its production in recognition of these growing demands. The Pocatello phosphorus plant, largest west of the Mississippi, has been in production since 1948, and has been expanded several times previously to insure continuity of supplies.

FERRO SIGNS FLORIDA DISTRIBUTOR FOR F. T. E.

An agreement for the sale and distribution of Ferro fritted trace elements, a fertilizer additive known as "FTE", throughout the state of Florida has been signed between Ferro Corp., and the Cummer Lime and Manufacturing Company of Jacksonville, Florida, according to an announcement by Gene L. Bruton, manager of Ferro's Agricultural Division.

CALSPRAY SUPPORTS FOREST FERTILIZATION STUDY

Washington State College researchers have received a $12,000 grant from California Spray-Chemical Corp. for a three year study of the problem of forest fertilization.

Investigations will be carried on under the supervision of Dr. R. B. Bertramson, chairman, Dept. of Agronomy. First step in the project will be to run different chemical tests on areas receiving different types of fertilizer treatments. They must determine first whether testing techniques can be developed by which to gauge the response in forest areas to the addition of chemical nutrients.

In addition to the official test areas, the researchers will also have available the "fertility test blocks" which have already been laid out by a number of lumber companies in the vicinity.

CONSOLIDATED MINING PLANS UREA PLANT AT CALGARY

Plans for installation of a 100-ton-per-day urea plant at Calgary, Alberta, have been announced by Consolidated Mining & Smelting Co. of Canada, Ltd. Vulcan-Cincinnati, Inc. has been named to supply engineering and equipment.

Expected to be in operation next year, the new plant will supply prilled urea to western Canada and the northwestern United States.

ANT CONTROL BY AIR

Citrus growers in San Diego county's Pauma Valley have experimented with airplane sprays to reduce ant populations in about 600 acres of grove, reports the *California Farmer*. Growers found the main advantage in using planes to be uniform coverage.

HOOKER ESTABLISHES NEW BUFFALO SALES OFFICE

The Eastern Chemical Div. and Durez Plastics Div. of Hooker Chemical Corp. have established a new district sales office in the remodeled Erlanger Building, 120 Delaware Ave., Buffalo, N. Y., according to John S. Coey and Alfred W. Hanmer, sales managers of the two divisions.

COLLIER TAKES OPTION ON 300 ACRES OF LAND

Collier Carbon and Chemical Corp. has announced that it has taken an option on about 300 acres of land in Contra Costa county near Rodeo, Calif.

A spokesman for the company said that Collier plans to use the site for future expansion of its carbon and petrochemical production facilities.

IMC OFFERS SALES TRAINING CLINICS FOR SALESMEN

International Minerals & Chemical Corp. is offering a new series of 10 cross country training clinics this fall for salesmen of fertilizer manufacturing companies. This year's meetings in 10 cities began October 12, and will end November 13. Total attendance is expected to be almost 500. Last year, more than 350 representatives of 156 fertilizer manufacturing companies attended the meetings.

New slides, movies and other visual aids are being used, and there are skits depicting certain sales situations.

Topics are divided basically into two sections. The first is the planned sale, or "what you have to know" to find sales and "what you have to do" to prepare for them. The second is the planned action, or "using what you know."

Ned Schenet, IMC's manager of merchandising who developed the courses, again is conducting the meetings, assisted by IMC personnel.

During October, the sales training clinics were held in Kansas City, Mo.; Shreveport, La.; Atlanta Ga.; Tampa, Fla.; Raleigh, N. C.; and Baltimore, Md. November 2–3 a clinic is being held in New York, N. Y.; Nov. 5–6, Columbus, Ohio; Nov. 9–10, Indianapolis, Ind. and Nov. 12–13, Minneapolis, Minn.

EVANS ADDS RADIOISOTOPE LAB TO ITS FACILITIES

A Radioisotope laboratory, equipped and staffed for basic research and industrial applications of radioisotopes, has been installed by Evans Research and Development Corp., New York City.

One application of the radioisotopic method to industry is in tracer analysis. An element or material can be "tagged" and signals its fate from one stage to another of a reaction or process.

FARMERS ELEVATOR CO. TO BUILD NEW BLENDING PLANT

The Farmers Elevator Co., Rock Valley, Iowa, plans to build a new fertilizer blending plant, with a capacity of 500 to 1,000 tons, according to a recent report.

CCA, JFA SWAP CONTROL OF JOPLIN FERTILIZER PLANT

Officials have announced that control of the Joplin, Mo. cooperative fertilizer plant shifted from Missouri Farmers Association to Consumers Cooperative Association.

For the past two years, MFA has owned 60 per cent of the shares of the ammonium phosphate plant and CCA 40 per cent. Now CCA owns 75 per cent and MFA 25 per cent. Built in 1953–54, the plant was wholly-owned by MFA until 1957. CCA reportedly paid the Missouri co-op about $1 million to gain control.

Under the new setup CCA will name three of the five directors of Farmers Chemical Co. Walter Horn continues as manager.

CENTRAL CHEM. BUYS NEWTON CHEM. & SUPPLY AGR. CHEMICALS DEPT.

On October 1, Central Chemical Corp. purchased the inventory and equipment owned by Newton Chemical and Supply Co.'s Agricultural Chemicals Dept., Bridgeville, Del. Central Chemical will continue to supply farmers and dealers in southern New Jersey, Delaware and peninsula counties of Maryland and Virginia, operating from the office and warehouses formerly used by Newton.

John L. Coyle, Jr. will manage the Bridgeville office, assisted in sales and field service by Frank Boys.

Newton Chemical reports it plans to continue serving its customers with fertilizer, petroleum products, fruit and vegetable packages from its present warehouse location. Its office will be at the former residence of the late Oliver A. Newton.

IMC REPORTS ON EXPANSION, IMPROVEMENT IN 1958-1959

International Minerals and Chemical Corp. spent nearly $14 million for plant additions, expansion and improvement in fiscal 1958–59 accroding to the company's 50th annual report.

Major expenditures were $2,786,953 at the Bonnie phosphate chemicals plant, near Mulberry, Fla., and $6,658,792 supplied to IMC's Canadian subsidiary toward completion of a new potash mine near Esterhazy, Saskatchewan.

The five-year expansion program completed this year at Bonnie has doubled the plant's production, which amounted to $20 million in 1958–59 sales.

The Saskatchewan potash mine, described as located on "the richest, most extensive muriate potash ore deposit known," is scheduled for initial production in 1960.

Agricultural Division "brass" of American Cyanamid Co. congratulate farm advisor John L. Quail (far left), Fresno County, Calif., as he receives Cyanamid's County Agent Award. Next to Quail, from left to right, are B. F. Bowman, marketing director; H. E. Clark, western regional manager; H. H. Phillips, assistant western regional manager; and E. H. Smythe, assistant marketing director. Third to be presented by the company, the silver plaque award is given to outstanding county agents in the nation.

GOVT. CONTRACT AWARDS

Arizona Fertilizers, Inc., Phoenix, Ariz., has been awarded a $10,011 prime contract to supply 10,650 pounds of 2, 2-dichloropropionic acid, sodium salt, to the General Services Administration.

Baird and McGuire Inc. Hallerook, Mass., has received an $8,160 prime contract for insecticides from the U. S. Navy Purchasing Office, Brooklyn, N. Y.

Mitsui and Company, Ltd., New York City, has been granted a $735,280 prime contract for 9,100 net metric tons of urea by the General Services Administration, Washington, D. C.

Mitsui & Co. also has been awarded a $10,504 prime contract to supply 130 net metric tons of urea to GSA.

Nylos Trading Co., Inc., New York City, has received a $16,250 prime contract to supply 200 net metric tons of urea to the General Services Administration.

Nylos Trading Co. also has been awarded a $268,125 prime contract to supply 3,300 net metric tons of urea to GSA.

Stevens Industries, Dawson, Ga., has been awarded a prime contract to supply 14,500 pounds of dieldrin at $.1943 to Maxwell Air Force Base, 3800th Air University Wing, Ala.

MONSANTO ACQUIRES STOCK OF NITRO INDUSTRIAL CORP.

Monsanto Chemical Co. has acquired all outstanding stock of Nitro Industrial Corp., a realty company with extensive property holdings in and around Nitro, W. Va., in exchange for 27,675 shares of Monsanto's common stock. Real estate which changed hands in the transaction includes more than 700 acres of industrial, commercial and residential property in the Nitro area, including some 180 acres of vacant land adjacent to Monsanto's present 58–acre plant site.

IMPERIAL CHEMICAL GRANTED S.B.A. GRANULATION PROCESS

Imperial Chemical Industries Ltd. and Societe Belge de l'Azote et des Produits Chimiques du Marley recently concluded an agreement, whereby SBA grants ICI the licence of its process for ammonium nitrate granulation.

REINHOLD PUBLISHES MANUAL OF INSECT MORPHOLOGY

Manual of Insect Morphology, by E. Melville DuPorte, Professor of Entomology, Macdonald College, McGill University, has been published by Reinhold Publishing Corp., 430 Park Avenue, New York City 22.

The author writes that the manual is final revision of the typescript text he has used over a period of some 40 years. The 224-page textbook is priced at $5.00.

Associations Meetings

NORKEM SPONSORS AERIAL APPLICATORS CONFERENCE

A regional aerial sprayers and dusters conference was held at the Hotel Chinook, Yakima, Wash., October 26 and 27, sponsored by Norkem Corp. Theme of the conference was "Expanding Horizons of Aerial Application."

New farm chemicals for aerial application and new methods of making applications were discussed by representatives of national manufacturers. Equipment, including some of the latest types of planes for aerial application, was displayed at the Yakima Municipal Airport on the second day of the conference.

Washington State University, Washington State Aviation Association, Washington State Aeronautics Commission and comparable organizations in Oregon, Idaho and Montana cooperated with Norkem, to make the meeting a success, the company said.

R. E. Jones, general manager of Norkem, writes that the company hopes to make the conference an annual affair.

COLO. AGR. CHEM. ASSN. SCHOLARSHIP AWARD

Allen McRay Wilson has been awarded the Colorado Agricultural Chemicals Association Scholarship for the 1959-60 school year at Colorado State University.

Wilson has been president of the Horticulture Club and worked this past summer at Littleton as an apprentice county agent on home garden problems.

Calendar

Nov. 2-4. Canadian Manufacturers of Chemical Specialties, second annual meeting, Royal York Hotel, Toronto, Canada.

Nov. 4-5. Fifth Annual Fertilizer Dealers Conference, Stillwater, Okla.

Nov. 4-6. Fertilizer Industry Round Table, Mayflower Hotel, Washington, D. C.

Nov. 8-10. National Fertilizer Solutions Assn. Annual Convention, Statler Hilton Hotel, St. Louis, Mo.

Nov. 9. South Carolina Plant Food Educational Society Annual Meeting, The Clemson House, Clemson, S. C.

Nov. 9-10. California Section, American Society of Range Management, Annual Meeting, University Room, Shattuck Hotel, Berkeley, Calif.

Nov. 9-10. American Bankers Association's National Agricultural Credit Conference, Netherland Hilton Hotel in Cincinnati, Ohio.

Nov. 9-11. California Fertilizer Assn. Annual Convention, Fairmount Hotel, San Francisco, Calif.

Nov. 12-13. Southwest Fertilizer Safety School, Tropicana Motor Hotel, Pasadena, Calif.

Nov. 12-15. Texas Aerial Applicators Association, Orange House, Orange, Tex.

Nov. 16-17. Farm Chemicals Marketing Seminar, Barbizon-Plaza Hotel, New York City.

Nov. 16-20. National Aviation Trades Association Annual Convention, Hotel Monteleone, New Orleans, La.

Nov. 23-24. First Plant Disease Short Course, Agricultural Extension Service, Memorial Student Center, Texas A. & M. College, College Station, Tex.

Nov. 24. Pesticide Dealers Conference, Blake Hall, College of Agriculture Campus, Nichol Ave., New Brunswick, N. J.

Nov. 30-Dec. 2. Carolinas-Virginia Pesticide Formulators Assn., Carolina Hotel, Pinehurst, N. C.

Nov. 30-Dec. 2. Soil & Crop Science Soc. of Florida, Gainesville, Fla.

Nov. 30-Dec. 4. 27th Exposition of Chemical Industries, New York Coliseum, New York City.

Nov. 30-Dec. 3. Joint meeting of the Entomological Society of America, the Entomological Society of Canada, and the Entomological Society of Ontario, Hotel Sheraton-Cadillac, Detroit, Mich.

Dec. 1-2. Carolinas-Virginia Pesticide Formulators Association Annual Meeting, Carolina Hotel, Pinehurst, N. C.

Dec. 2-3. Indiana Fertilizer Conference, Memorial Center, Purdue University, Lafayette, Ind.

Dec. 2-3. Missouri State Fertilizer Conference, Columbia, Mo.

Dec. 7-8. Annual Soil and Fertilizer Short Course, University of Minnesota soils department, campus of the Institute of Agriculture in St. Paul.

Dec. 7-9. Chemical Specialties Manufacturers Association Annual Meeting, Mayflower Hotel, Washington, D. C.

Dec. 7-10. Western Canadian & North Central Weed Control Conference, Royal Alexandra Hotel, Winnipeg, Manitoba.

Dec. 9-11. International Crop Protection and Pest Control Exhibition, Seymour Hall, St. Marleybone, London, England.

Jan. 6-8. Fourteenth Annual Northeastern Weed Control Conference, Hotel New Yorker, New York City.

Jan. 13-15. Agricultural Ammonia Institute Ninth Annual Convention, Statler Hilton Hotel, Dallas, Tex.

Jan. 14-16. Agricultural Aircraft Association Tenth Annual Convention, El Mirador Hotel, Palm Springs, Calif.

Jan. 20-21. Northwest Agricultural Chemicals Industry Conference, Benson, Hotel, Portland, Ore.

Jan. 20-22. Thirteenth Annual Southern Weed Conference, Vista Hotel, Biloxi, Miss.

Jan. 25. Annual Lime and Fertilizer Day, University of Wis., Madison

Jan. 25-26. Pesticide Conference, Memorial Center, Purdue University, Lafayette, Ind.

Jan. 25-28. Plant Maintenance & Engineering Show and Conference, Convention Hall, Phila., Penna.

Jan. 26-27. South Dakota Fertilizer Dealers Program, South Dakota State College, College Station, S. D.

Jan. 27-29. The Tennessee Valley Authority and The Southern Regional Soil Research Committee Symposium on the Chemistry of Phosphate-Soil Reactions, Muscle Shoals, Ala.

Jan. 28-29. Annual Meeting of the Colorado Agricultural Chemicals Association, Cosmopolitan Hotel, Denver, Colo.

Feb. 8-9. Meeting of the Southwestern Branch, Entomological Society of America, Hilton Hotel, El Paso, Tex.

ROUND TABLE THEME: "PRACTICAL PROBLEMS OF PROCESSING PHERTILIZERS"

The Fertilizer Industry Round Table, being held November 4–6 at the Mayflower Hotel, Washington, D. C., features several good items of interest to manufacturers of conventional fertilizer mixtures reports Vincent Sauchelli, chairman, H. L. Marshall, J. E. Reynolds, Jr. and Al Spillman.

The revised Round Table program is as follows:

Wednesday, Nov. 4

10:00 a.m. "Plant Processes from Raw Materials to the Bag," L. V. Clegg and staff, Canadian Industries, and Al Henderson, Wilson and Toomer.

1:30 p.m. Question period on a.m. talks.

3:00 p.m. "Mechanics of Formulation Calculations," W. J. Tucker, G. L. F.; J. E. Reynolds, Jr., Davison; T. R. Schmalz, F. S. Royster; and H. H. Tucker, Sohio Chem.

3:45 p.m. "Models Replace Blueprints," W. A. Lutz, Dorr-Oliver.

Thursday, Nov. 5

9:30 a.m. "Problems of Conventional Fertilizers."

(a) "Mechanical Condition," J. O. Hardesty, USDA.
  (1) "Use of Urea-Nitrate Solutions," H. H. Tucker- Sohio Chem.; G. R. Gilliam, Allied; J. W. Lewis, DuPont.

(b) "Segregation."
  (1) "Particle Size of Raw Materials," W. L. Hill, USDA.
  (2) "Mixing—Rotary & Gravity," H. B. Krueger, Stedman; R. E. Robinson, Atlanta Util.; W. Sackett, A. J. Sackett Co. and R. E. Hefler, Ransom Mach.

1:30 p.m. "Semi-Granular Mixtures."

(a) "Rotary Mixer," T. R. Schmalz, F. S. Royster.

(b) "Eyman Process," G. Walton, Tennessee Corp.

(c) "Block Sparger," J. Sharp, Spencer Chemical, and E. Perrine, Nitrogen Div., Allied.

3:00 p.m. "Statistical Quality Control," C. H. McCall, Booz-Allen Research, and Vance Ward, Canadian Industries.

Friday, Nov. 6

9:30 a.m. "Preneutralization," G. R. Gilliam, Allied Chemical; G. Marburger, Spencer Chemical; P. E. Stone, Virginia-Carolina; F. G. Keenan, DuPont and N. K. Alfrey, Research Div., W. R. Grace.

TEXAS A&M HOLDS FIRST PLANT DISEASE SHORT COURSE

November 23 and 24 are the dates for the first Plant Disease Short Course to be presented by the Department of Plant Physiology and Plant Pathology at Texas A & M College. The course will be held in the Memorial Student Center, College Station.

Harlan E. Smith, extension plant pathologist, reports that the short course is mainly for farm chemicals company representatives. However, he has invited pest control operators, nurserymen and others to attend.

Identification and control of cotton, vegetable and ornamental diseases will be emphasized, and there will be a special night session on November 23 of exhibits and demonstrations.

NAC ISSUES PRESS RELEASE ON ENCEPHALITIS OUTBREAK

During the recent outbreak of encephalitis in the New Jersey area, the National Agricultural Chemicals Association sent to editors information on control of this and other diseases carried by mosquitoes and other insects.

In a letter accompanying the NAC book, "Open Door to Plenty," L. S. Hitchner, executive secretary, said, "Competent authorities and scientists in mosquito control have advised us that this potential threat has been known for some time but could have been practically eliminated if greater support had been given to the programs of mosquito control . . ."

He added that "there are competent entomological and medical experts in the public health service, mosquito control commissions and at the state university who can direct the selection and application of proper materials effectively with no hazard to the public—in fact they will protect the public health, with no permanent adverse effects to wildlife."

▼ AT THE INDUSTRY TOUR

Members of the California Fertilizer Industry Tour and School, attended by some 50 bankers and professional farm managers, make a stop at the Hercules Powder Co. plant, Hercules, Calif. Dr. Richard B. Bahme, regional director for the National Plant Food Institute, who arranged the NPFI-sponsored tour, stands in center. Others (left to right) are Gordon Dudley, acid supervisor at the Hercules plant; Don Allison, senior technical representative, Hercules, San Francisco; Bahme; Fred S. Orth, assistant vice president, Bank of America, San Francisco; and J. J. Cannon, Agr. Loan Section vice president, Bank of America, San Francisco.

13TH ANNUAL SOUTHERN WEED CONFERENCE

Use of selective herbicides for weed control in specific crops will be thoroughly explored during the 13th Annual Southern Weed Conference at the Buena Vista Motel in Biloxi, Miss., Jan. 20–22, 1960.

According to V. S. Searcy of the Alabama Polytechnic Institute, Auburn, Ala., conference president, the following general topics will be grouped into sectional programs during the three-day meeting: fundamental aspects of weed control; control of specific weeds; control in specific crops; weed control in pasture and turf; brush and weed control in non-crop areas; horticultural weed control; aquatic weed control; extension aspects of weed control; public health aspects of weed control; and new developments.

Dr. Don Davis, also of API, is chairman of the program committee.

FERTILIZER INDUSTRY ATTACKS HAZARDS

Recognizing the need for reducing the accident rates in fertilizer plants, the Fertilizer Section of the National Safety Council, and the National Plant Food Institute, have jointly sponsored five regional safety training schools covering the entire country.

Three of the schools have been very successfully completed—one at Ithaca, New York for the Northeast, at Chicago, Illinois, for the Midwest, and at Atlanta, Georgia, for the Southeast. Still to be held is the Farwest School which is to be held in Fresco, California, on November 5–6, under the direction of O. J. Chinnock, technical representative of Hercules Powder Company, and a school for the Southwest, which will be held in Houston, Texas, November 12–13, under the direction of A. I. Raney, safety director for Phillips Chemical Company. The schools are open to all supervisors in the fertilizer industry. As over-all director of the supervisory training program, W. C. Creel, safety director, Department of Labor of the State of North Carolina, guided the organization of the schools to see that effective instruction was planned and administered.

SOIL FERTILITY PROGRAM HELPED BOOST CROP VALUE

Georgia's Intensified Soil Fertility Program played a "very important part" in enhancing, by $47 million, the value of crops in 1958 compared with 1957. That's the opinion of J. R. Johnson, extension agronomist and project leader, University of Georgia College of Agriculture, in appraising the 1958 program which was supported by the American Potash Institute, Georgia Plant Food Educational Society, the National Plant Food Institute and individual fertilizer companies operating in Georgia.

In evaluating the dollar increases of crops for 1958 compared with 1957 Johnson included $20 million for corn; $4 million for cotton; $9 million for tobacco and $14 million for peanuts.

New Officers and directors of the Canadian Agricultural Chemicals Association, elected during the seventh annual meeting at the Chateau Frontenac, Quebec City, Sept. 20–23:
Front row (l to r) E. G. Law, J. G. Hastings, R. B. Marr, J. K. Brown
Second row: D. K. Jackson, H. S. Smith, J. S. Young
(assn. unable to identify), J. H. Elliott, C. R. Burrows
J. Busch

People

American Agricultural Chemical Co. James G. Link, Jr. has been named a southern regional agronomist. With headquarters at Montgomery, Ala., he will be in charge of agronomic service work at Agrico's offices at Montgomery, Pensacola, Fla., and Nashville, Tenn.

Link

American Cyanamid Co. Promotion of two Agricultural Div. executives has been announced: C. R. Kennedy, former northeast regional manager becomes assistant manager of the Phosphates and Nitrogen Dept. H. H. Phillips, former assistant western regional manager, has been named to replace Kennedy.

Kennedy

Phillips

Realignment of research scientists also was announced. Dr. J. T. Thurston has been named manager of research and development; Dr. E. L. R. Stokstad, director of research in biological sciences; and Dr. T. H. Jukes, director of chemical research.

American Potash & Chemical Corp. Dr. Donald S. Arnold succeeds Donald E. Garrett as manager of research at the company's main plant at Trona, Calif.

Atlas Powder Co. Dr. John W. Hoopes became director of the chemical engineering department in Atlas' Chemicals Div. on Oct. 1, succeeding Marshall T. Sanders. Sanders, who is eligible for retirement, has agreed to remain at Atlas in the new position of techni-

cal assistant to the executive vice president, Edward J. Goett.

H. J. Baker & Bro. Franklin Wheeler has joined the New York office to assist in the development of new markets and general product promotion. Prior to joining H. J. Baker & Bro., he was, for three years, sales manager for Allied Chemical International Corp.

The Bunker Hill Company. William G. Hewitt, marketing analyst, has been appointed assistant to the president.

Hewitt will continue to work with problems pertaining to Bunker Hill's entry into the fertilizer industry, on diversification with Harold E. Lee, Bunker Hill vice president, and on marketing.

California Spray-Chemical Corp. has appointed Francis R. Uttermohlen as a district agronomist in the Southwest. With Calspray since December 1, 1955, Uttermohlen will work out of the Phoenix, Arizona, district office.

Chemagro Corp. James P. Flavin has been named field research representative for the south central states. Flavin joined Chemagro in 1955 and has been assigned to the Product Development Section since that time.

Flavin

Dr. James R. Costello was named to head the combined operation of the Process Development Section and Pilot Plant Section. The sections have been combined and will function as an integrated unit to be known as the Process Development Section.

Climax Molybdenum Co., Chemical Div. E. E. Smith has been appointed manager of the division, and will direct all chemical sales and development activities. Smith had served as manager of chemical sales.

Columbia-Southern Chemical Corp. Appointment of Richard C. Oswant as manager of advertising for the Pittsburgh Plate Glass Co. subsidiary has been announced. Oswant served as editor of Columbia-Southern's *Chemicals* magazine during the past three years. He will continue as editorial director of the external publication.

Oswant

Commercial Solvents Corp. Loy A. Everett becomes sales manager of the Agricultural Chemicals Sales Dept., succeeding Clyde T. Marshall, who has resigned. For the past two years, Everett has been assistant sales manager of the department. Before joining CSC he was with Virginia-Carolina Chemical Corp.

Everett

Consumers Cooperative Association. Bruce McCully succeeds Howard Cowden as general manager. Cowden will continue as president and chief administrative officer.

Diamond Alkali Co., General Sales and Market Planning Dept. John R. McCullough is named special staff assistant to the director of sales, and David F. Hahlen becomes an analyst in the Market Planning Group. Douglas G. Johansen has been appointed as an agricultural sales serviceman for the Chicago branch sales office.

Du Pont Co. has announced appointment of George E. Miner to the new post of West Coast representative for Du Pont garden products. He had been garden products representative in the Philadelphia area since 1956.

Federal Chemical Co. Election of John R. Sargent as senior vice president for sales and of William Morris Newman as vice president for sales has been announced. Sargent began his career with the company in 1915 and has been vice president for sales since 1945. Newman had been vice president and treasurer of Price Chemical Co.

Sargent

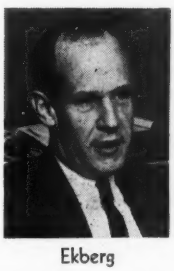
Newman

International Minerals & Chemical Corp. Otis W. Allen, a 29-year employee of IMC, has been appointed research specialist in the company's Research, Engineering and Development Div., with offices in the Florida Experiment Station, Mulberry, Fla. Allen will concentrate on techniques toward producing higher analysis plant food materials and will serve as the division's expert on phosphate technology.

Allen

Michigan Chemical Corp. has named George L. Innes as director of sales and development.

Monsanto Chemical Co. has established the new position of product director for agricultural chemicals in the Organic Chemicals Div. and named J. Paul Ekberg, Jr. to the post. Ekberg had been assistant director of sales planning for the division. He is responsible for planning, recommending, coordinating and evaluating efforts and results



Ekberg

of the division's research, development, engineering, manufacturing and sales functions in behalf of agricultural chemicals.

Niagara Chemical Div., Food Machinery and Chemical Corp. Dr. Oscar H. Johnson has been appointed assistant to division manager. He goes to this position in Middleport, N. Y. from the New York City office of FMC where he has been director of research and development for the Organic Chemicals Dept.


Johnson

Northwest Cooperative Mills. Roger Olmsted, plant manager of the Green Bay, Wis. fertilizer and phosphate plants has been promoted to manager Fertilizer Div., with headquarters in St. Paul, Minn. He succeeds W. E. Jones, elevated to general manager of the company.

Rohm & Haas Company. Dr. Peter J. Clarke, purchasing director and assistant secretary, was killed in an automobile accident near Philadelphia, Wednesday, September 16. He had served as head of the Purchasing Department since 1939 and had held the post of Assistant Secretary since 1943. He was 56.

Smith-Douglass Co., Inc. R. J. (Dick) Fosdick has been named assistant sales manager for mixed fertilizers in the Southwest. Fosdick, who has managed a sales territory in Cedar Rapids, Iowa, has transferred to Texas City, Tex.

Spencer Chemical Co. has added five men to its sales and technical service staff, Agricultural Chemicals Div.: Richard R. Redle becomes Michigan sales representative; Donald C. Mitchell, Oklahoma sales representative; Julian F. Holloway, Arkansas sales representative; Edward J. Hallacy, technical service representative, Southwest district; and Hubert L. Balay, technical service representative, Northwest District.


Monson

C. L. "Chuck" Monson will manage the new Northwest district sales office for the Agricultural Chemicals Div. The recently-established office has its headquarters at 8401 West Dodge in Omaha, Neb. Monson, who joined Spencer in 1948, has served in a number of sales positions, most recently as manager of national accounts.

Sunshine Plant Food Co. B. E. Adams has been elected president; E. F. "Bud Williams, former president, was named chairman of the board; and James F. McFarland was elected secretary-treasurer. Adams joined Sunshine as executive vice president in June, 1958.


Adams

U. S. Industrial Chemicals Co. Walter J. Kilmer has been made manager of the Detroit Sales Div. He succeeds Fred M. Henley, who is retiring.

Virginia-Carolina Chemical Corp. has added a second agronomist to its home office staff. Paul Blizzard, formerly a V-C fertilizer salesman out of Greensboro, N. C., will assist the company's head agronomist, Myron Keim.


Blizzard

Remember . . .

"FCMS"

details on pages 19-21

Chemicals

2,4-D MAY BECOME RESEARCH TOOL

Agricultural chemists at the Michigan Agricultural Experiment Station report that they have treated plants with 2,4-D and as a result changes occurred in mineral content in several portions of the treated plants.

Chemist Sam Bass of the Michigan Station says changes were observed in the percentages of boron, calcium, iron, magnesium, potassium, phosphorus, and sodium in the various parts of the plant. But in the roots, he says, percentages of iron and manganese were about the same in treated and non-treated plants. Just why variations occur in amounts of minerals deposited in different parts of the plant treated with 2,4-D is not known, but it is apparent, Bass says, that some of the plant mechanisms are altered. He feels that these studies may help speed up the investigations on plant life.

NEW CONTROL FOR WOODY PLANTS, DEEP ROOTED WEEDS

A new weed and brush killer developed especially for control of deep-rooted weeds and hard-to-kill weed trees is being introduced by Allied Chemical's General Chemical Division.

Tradenamed "Urab," the herbicide is effective against scrub oak, wild hickory, sassafras, poison sumac and other weed-trees. It also will control such weeds as trumpet vine, briars, cattails, Canada thistle, and all types of brush, General Chemical reports. It is designed for use in non-crop areas.

Toxic ingredient in Urab (3-phenyl-1, 1-dimethylurea trichloroacetate) is soluble in water. The herbicide comes in both liquid and granular form.

SELECTIVE INSECTICIDE CONTROLS ALFALFA PESTS

A chemical that kills few beneficial insects and still destroys a number of important field crop pests has performed well in experiments at the University of California.

Vernon M. Stern, Robert van den Bosch and Harold T. Rey-

nolds, all of the Riverside campus, report that the new insecticide, Dylox, at low to moderate dosages is only slightly toxic to lady beetles which are useful in controlling pests of alfalfa, chiefly aphids.

Since Dylox also is relatively nontoxic to honeybees, the scientists suggest that the insecticide can be used to control alfalfa seed pests when the seed fields are in bloom.

Equipment Supplies

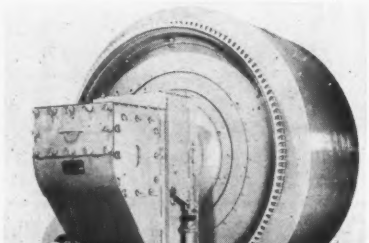
STURTEVANT SHIPS REMOTE CONTROL, AIR-ACTUATED, 4-WAY FERTILIZER MIXER

A remote-controlled, air-cylinder-actuated fertilizer mixer, with capacity of up to two-and-a-half tons per batch (50 to 65 tons per hour) has been designed, engineered and fabricated by Sturtevant Mill Co. The mixer has been vented to allow immediate expulsion of steamy corrosive vapors and engineered to eliminate the need of spout and elevator at point of discharge. The unit feeds directly into a granulator-cooler.

Extra-heavy gauge steel was used in constructing the mixer, Sturtevant says. Some parts, such as the introduction-discharge hopper, remain fabricated of stainless. Revolving scoops of the cylindrical mixer are fabricated of Corten steel.

The new mixer will be made available in capacities of from a quarter ton per batch (4 to 7½ tons per hour) to the 50–65 ton per hour mixer recently shipped.

For more information,
CIRCLE 350 ON SERVICE CARD


New Sturtevant Mixer

PLASTIC NOZZLE WITH CAPTIVE CAP DEVELOPED

Development of the "Flip Cap", a polyethylene nozzle with a permanently attached cap, designed to increase the filling and closing speeds of round and oblong nozzle-type cans, has been announced by Continental Can Co.

Packers of insecticides may safely use the new closure, Continental reports. Unlike the present oblong "F" style can, fitted with a threaded

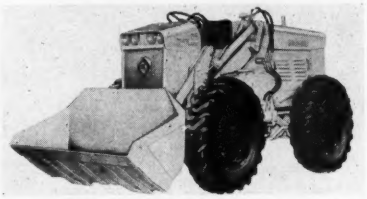
nozzle through which the packer fills his product, a can using the "Flip Cap" is delivered with a perforated top. The opening, considerably larger than the final nozzle opening, permits faster filling.

The nozzle is delivered with the captive cap seated in closed position and is automatically inserted into the curled perforation.

Further details on the "Flip Cap" can be obtained by

CIRCLING 351 ON SERVICE CARD

TWO TYPES OF TRANSMISSION OFFERED ON TRACTOLOADER



The Model TL 14 TractoLoader, a front-end wheel loader, now is available with either the Allison full power shift transmission or new Tractomatic power reversing transmission, reports Allis-Chalmers Mfg. Co.

On the Tractomatic transmission, a single hydraulically operated steering column lever controls both forward and reverse movement without clutching, shifting gears or stopping the machine.

The 5300 lb. carry capacity unit is available with 6 buckets ranging in size from 1 to 3 cubic yards.

For complete information

CIRCLE 352 ON SERVICE CARD

Suppliers Briefs

Chase Bag Co. has announced that A. C. "Chad" Ogden, sales manager of its Kansas City Branch since 1956, has been appointed special representative in the Kansas City area. He has been succeeded as sales manager by H. R. Quimby, a sales representative for Chase in the same territory since 1946.

Continental Can Co., Inc., has started up production of CLUPAK paper at its Hodge, La., paper mill, reports G. E. Amerman, president of Clupak, Inc. The new unit has been installed on a 246-inch wide machine, which has a production capacity of about 250 tons a day.

Davidson-Kennedy Co. has named Harrold Kitchens as manufacturers sales engineer, and Davidson-Kennedy Associates Co. has appointed Horrall Harrington manager of commercial development.

Highway Equipment Co. Heil Northeast Products Corp., South Burlington, Vt., will distribute "New Leader" products in Vermont, with the exception of Bennington County, and will also serve Clinton, Franklin and Essex Counties in New York.

The Frank G. Hough Co. H. R. Brown, sales manager of the Payloader Section, has announced appointment of David D. Hunsaker as manager, sales development. Formerly a district manager, he has been with Hough for almost 14 years.

(Continued on page 59)

MEN

METHODS

RESULTS

H. K. Ramaley, chemist, at work in the YVS laboratory

The three-cornered foundation which means success for Yakima Valley Spray Company

By HOMER HATHAWAY

IT WOULD seem impossible to build a four-square business on a three-cornered foundation, but Yakima Valley Spray Co., Yakima, Washington has done exactly that. These cornerstones are Men—Methods—and Results.

Probably the most dynamically important of these are the methods used by Yakima Valley Spray to secure and hold farm chemical business, both in dry fertilizers and pesticides. However, it is almost impossible to separate the men from the methods, and the ultimate results are a combination of each.

However one particular method employed by the company has proven to be its biggest and best business getter. Since 1938 Yakima Valley Spray has maintained its own extensive soil-testing laboratory, giving a personal service unexcelled in the region by any other formulator. Although Sid Martin, manager, is frank to admit that a new farm chemicals company just starting out in business might find the establishment of such a lab prohibitive costwise, it has certainly been the mainspring from which much of YVS success has sprung.

Yakima Valley Spray started out in 1922 as strictly an insecticide operation, liquid lime and sulphur being the bread and butter item of business in those days. Fertilizers were added in 1937, and the business has grown to such an extent that now about 50 per cent of their business is done in dry fertilizer and 50 per cent in liquid insecticides and pesticides.

Establishment of the soil-testing laboratory was the big stride into the fertilizer field, and YVS was definitely a pioneer in this movement. They believed in the future of such a development long before it became standard practice, and were even far ahead of many of the agricultural colleges in seeing the potential of such an operation.

The lab is not an immense operation, although at the present time it has over $8000 in equipment alone. But for the size and its layout, it does a tremendous amount of physical work, all under the direction of H. K. Ramaley, company chemist.

Work performed by the lab for customers, or potential customers, is strictly on a gratis basis, although the lab is also employed to do soil-analysis work for other companies. This latter work is all done on a pay basis, however.

The procedure followed in soil-analysis is thorough and complete. When a soil-analysis is requested, one of the technical staff goes into the field, accompanied by the grower.

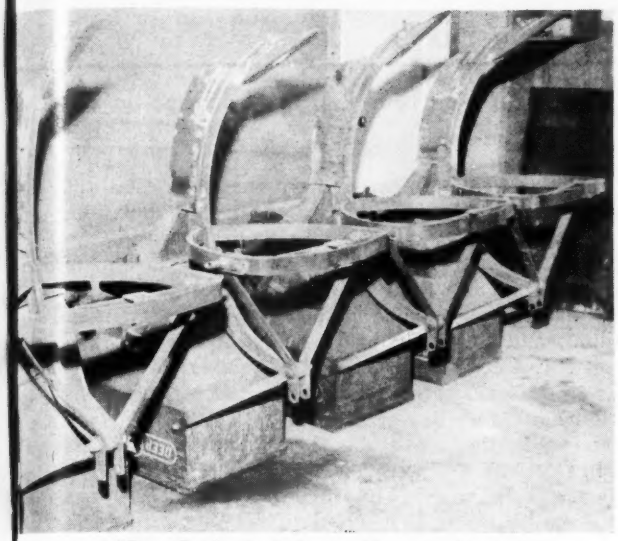
"A farmer needs more instruction than he can get from a few words he reads in a book, and if they go along with us and see exactly how we take a soil sample, they can do it themselves the next time if they want to do so. Also by going into the field with the farmer, we can point out certain things in that field to him that he may be overlooking, such as trouble spots which will have to be given different treatment to produce effectively," said Ramaley.

Reports can be gotten into the hands of the grower within 48 hours when required. The report is again taken in person to the grower by one of the company technical staff, either Dr. W. S. Regan, Carl Hopkins or Ramaley, who goes over it with him, telling him exactly what is needed, and the grower generally follows these recommendations.

GETTING COMPLETE INFORMATION

If the grower is a new customer, when he is first approached for a soil-analysis, the fieldmen find out what he raised on the soil last year, how much and what type of fertilizer was used; asks what crop is going to be planted into the test area and all important items in determining what recommendations should be made.

Another thing which YVS has discovered in the past few years is the fact that soil analysis of the



"Deep Feeders" which are sold or rented to growers

second 12 inches of soil is just as important, perhaps even more so, than the first 12 inches.

"This is especially true of fruit tree crops, where roots go deep, far beyond the first 12 inches. Unless we can determine what nutrients are needed in that second 12 inches the grower will be wasting his money, since some of the nutrients he puts into the soil won't be going deep enough to be of value to his particular needs," said Martin.

EXPERIMENTING WITH DEEP FEEDER

In connection with this "deep feeding" of fertilizers, YVS has recently been experimenting with a deep feeder manufactured by the Pittsburgh Forging Co. Many of these have been sold to growers, while others are kept by YVS as rental items for growers who need them. This deep feeder with a banding attachment reaches deep into the soil, from 12 to 18 inches, and is especially useful when fertilizing orchards, vineyards and hop fields, where deeper placement is essential.

"Every year sees improvements in this particular type of machine," said Martin. "We pass on suggestions to the company which we receive from the farmers, and the next year those improvements show up on the new models."

YVS also has other physical equipment which they lend to farmers on a first come-first served basis, such as "easy-flow" spreaders. If a farmer who is not a customer, but who has bought his fertilizer elsewhere seeks use of their equipment, however, he is charged a modest rental.

YVS does much custom-mixing, both in fertilizers and pesticides and insecticides. However, they will not attempt to sell a custom-mix to a grower unless he definitely needs such a mix. If a commercial mix already on hand will do the job required, then the farmer is encouraged to save unnecessary expense by using the commercial mix.

Another of the methods used to contribute to the growing success of YVS is their sales department. The two technical salesmen on the staff handle the bulk of sales, and their approach is strictly from a service standpoint.

"We don't drive up and down the country roads and knock on doors," said Dr. Regan. "We always seem to have calls far ahead, neverhteless. We never call on customers without having a definite reason to do so, either we have been called by them, or another customer has told us to call on them, since the potential customer has already expressed interest in the results being obtained by the present customer.

"First of all, we study the grower's problem, whether it is pests which are threatening his crop, or whether it is a lack of plant nutrients. Then when the problem has been analyzed we set out to find its solution. And we talk to the grower in a language he can understand, with absolutely no techincal terms thrown in. The farmer is more impressed by what he can understand rather than by what you may know in terms of technical know-how. He has confidence in your technical ability, but only if it is expressed to him in his own language."

How well does YVS speak the farmer's language? Well, the results have been nothing short of phenomenal. From a small beginning, Yakima Valley Spray now occupies a building three-stories high with approximately 44,000 square feet of working space.

However, there is another way of measuring the results of their work, a method down in black-and-white. This is a row of file cabinets which contain complete records of the work they do for their customers. Some of these records go back as far as nine or ten years, when they were first begun. On these sheets are kept the information from each soil-test run on a specific piece of land, the recommendations made, the fertilizer used and the results. These records are open for inspection by the customer at any time, and they also help greatly in determining when it is time for soil-testing a particular plot of land again. These records also indicate another important point—the incidence of repeat customers, and it is extraordinarily high!

YEAR 'ROUND OPERATION

This combined effort of men, methods and results has also extended over into the year-round management of the plant. During off-peak months when many plants are forced to shut down, even lay off key personnel, YVS is kept busy, since Martin has gone out and aggressively sold his plant facilities to the manufacturing of farm chemicals for other companies. Employment hits its peak around March thru August, when 40 people will be working, and drops to 14 in the off-peak periods. Nevertheless, the plant, due to its diversification, keeps operating all year.

"Our men, methods and results," said Sid Martin, "are endorsed by colleges, soil conservation people, and extension services. We exchange methods and discussion with the laboratory personnel at Pullman, and their personnel often come over here and spend time with us. Neither of us knows all the answers, but by pooling our knowledge we are coming closer to learning more about what makes soil productive to its utmost capacity."

Men-Methods-Results! The triangle which means success for Yakima Valley Spray Company. ▲

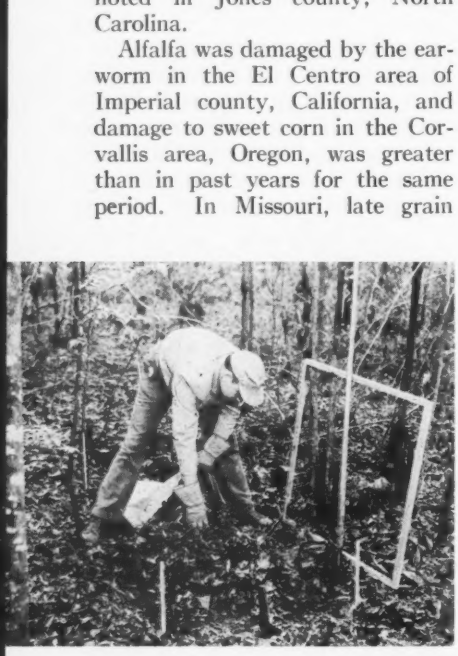
PEST REPORTS

*By Kelvin Dorward**

THE ***corn earworm*** was very active on soybeans in several states during early September. The outbreak in the eastern counties of Virginia was quite general from the North Carolina line to King George county. In Westmoreland county, Virginia, the outbreak was one of the heaviest ever experienced. Seventy-five per cent of the 5,000 acres of soybeans in the county either received or needed treatment. Corn earworm infestations were building up on soybean pods on the Eastern Shore, Maryland, by the middle of September. Some late fields were heavily infested.

The corn earworm was a major problem on soybeans in Richland, Calhoun, Orangeburg, Florence, Clarendon, Allendale, and Darlington counties, South Carolina. Heavy infestations on soybeans were also reported from Baldwin county, Gerogia. Moderate infestations were reported from the same crop in St. Clair county, Alabama. Stripping of soybean leaves by the corn earworm was noted in Jones county, North Carolina.

Alfalfa was damaged by the earworm in the El Centro area of Imperial county, California, and damage to sweet corn in the Corvallis area, Oregon, was greater than in past years for the same period. In Missouri, late grain sorgums throughout the state were damaged.



Survey scout collects two-square yard sample of woods trash containing hibernating boll weevils. Counts of hibernating insect stages per lineal or area unit are used for estimating next season's infestations of European corn borer, grasshoppers, beet leaf-hoppers as well as boll weevil.

Soybeans were also damaged in several areas by the ***velvetbean caterpillar*** during September. The insect caused severe damage in Mobile, Henry, Chilton, and St. Clair counties, Alabama. In Georgia, heavy infestations on soybeans were found in Baldwin county and damage was on the increase by the middle of September in Dorchester county, South Carolina. Damage was also recorded in several other South Carolina counties. The velvetbean caterpillar damaged about 50 per cent of the soybean pods in Lenoir, Johnston and Wayne counties, North Carolina.

Although no serious otubreaks of the ***spotted alfalfa aphid*** were reported during September, the pest was widespread and building up in certain areas. Adults and nymphs of the aphid were found on September 22 in Morrow and Umatilla counties, Oregon, for the second consecutive year. The insect was found in Wheeler county, for a new county record and more new county records are expected as the survey progresses. This year's distribution in Oregon is expected to exceed that of last year. Infestations were very light in southern Nevada. In Utah, the spotted alfalfa aphid was considered to be generally distributed throughout the state even though it had not been collected in all counties.

Spotted alfalfa aphid populations were increasing on susceptible varieties of alfalfa in Arizona but, in general, populations over the state remained low. Populations were building up in many alfalfa fields in Chaves and Eddy counties, New Mexico. Counts were light in counties reporting from Colorado, Oklahoma, Texas, Arkansas and Missouri. In one alfalfa field in Chase county, Kansas, damage was estimated at 10 per cent with spotted alfalfa aphid populations of over 400 per net sweep. The highest populations in Nebraska, up to 150 aphids per sweep, were reported from the counties in the Republican Valley. Populations decreased to the east with infestations found in only 20 per cent of the fields in eastern Nebraska and none in the northeastern counties. The spotted alfalfa aphid was found in Indiana September 22 for the first time in two years. Specimens were found only in the Ohio and Wabash river valleys and counts were low.

The ***meadow spittlebug*** has been on the increase for the past several years in Indiana. The 1959 infestation was apparently the highest on record for the state with high counts in the eastern portion and epidemic status being reached in the southwestern area. By applying a formula of loss of 10 to 12 pounds of forage per acre per spittlebug per square foot, not to exceed one ton per acre, it was claculated that the spittlebug caused a loss of over $13,000,000 to the alfalfa and clover crops of Indiana in 1959. In a large part of northwestern and southwestern Indiana, population did not justify control and the loss was calculated to be $850,365, thus the preventable loss was figured at $12,191,880.

The meadow spittlebug survey in Illinois was concluded in September. The outlook for 1960 was for slightly lighter populations than in 1959. As in 1958, the heaviest populations were found in the northern area of the state, but these were rated as moderate. Light infestations were recorded for the north central area with non-economic numbers being found in the remainder of the state.

Although by September the cotton season was well advanced, ***bollworms*** were still causing concern in certain areas. Heavy infestations of bollworms were reported in cotton in the Shafter and Delano areas of Kern county, California. Controls were still necessary in some Imperial county fields. Populations of the insect were statewide in Arizona with considerable loss of squares and bolls being reported from the central section. In Nevada the number of bolls infested by the bollworm was ap-

*Chief Staff Officer, Survey & Detection Operations, Plant Pest Control Div., Agricultural Research Service, USDA.

HOW THE POST OFFICE CAN HELP YOU SELL

(Continued from page 18)

Here are two outstanding examples of the "keep-in-touch" letter:

Dear Dave,

I'm proud of you!

It wasn't until last night that I heard you were taking over the reins as purchasing agent.

A step up like that doesn't come by accident. As one guy who has had the pleasure of doing business--and battle--with you, I can only say that your company will get more of its money's worth from you than ever before.

With all my best,

Smooth, subtle, on the button, the cleverly couched compliment in paragraph three will not do the recipient any harm, should his boss see it—a fact the writer well knew.

The next letter is a sure winner, for it is not only a spontaneous gesture of friendship, but probably means money in the bank for the retailer recipient:

Dear Mr. Brown:

Last Monday, when I called on my best account in Joliet, I mentioned the problems you were having with charge account collections. This customer, Mr. Hugh Conrad, showed me two letters which he claims have virtually eliminated the problem for his store.

At my request, he was kind enough to let me have the enclosed copies of these letters for you. And he says further that you may feel free to use them in any way that serves your advantage.

Hope business is on the upbeat and that you will wire, write or phone my office should you need any help before I make my next trip to your city.

Sincerely,

There is, obviously, just one limit to the use of a letter as a sales tool: the salesman's imagination. ▲

PESTS

(Continued)

proximately three times greater than in any previous year. Damage from the bollworm was also recorded from Tennessee.

Even though the season was extremely late, heavy infestations of the ***cotton boll weevil*** caused one of the most extensive late season treatment programs ever experienced in McCormick county, South Carolina. In north central Texas, one of the heaviest late season boll weevil buildups ever noted was reported in early September.

A recent survey indicated that ***spruce budworm*** egg masses on about 600,000 acres in northern New Mexico were approximately three times the number found in 1958. In Texas approximately 17,000 acres of loblolly pines were treated for a ***pine sawfly*** during July and August. The area treated was in a section severely defoliated in the fall of 1958 and threatened again this year. Although treatment was expected to reduce the population to a low level, there was concern about a possible buildup again this fall and next year.

SUPPLIERS BRIEFS

(Continued from page 55)

St. Regis Paper Co. reports that Chemical Packaging Corp., which it recently acquired through an exchange of stock, will be operated as a subsidiary specializing in the sale of multiwall bags and packaging equipment to the fertilizer industry east of the Mississippi river.

Yale & Towne Mfg. Co. Dees Equipment Co., Greensboro, N.C., has been named franchise representative for the sale and service of Yale industrial lift trucks and tractor shovels in eastern, central and northwest North Carolina. Belmont Equipment Co., Inc., Evansville, Ind., becomes franchised sales and service representative for the same products in southwest Indiana, southeast Illinois and western Kentucky.

ESTIMATING REAGENT A
in Superphosphate Pr

By E. J. FOX and W. A. JACKSON
Fertilizer Investigations Research Branch
Soil and Water Conservation Research Division
Agricultural Research Service
U. S. Department of Agriculture
Beltsville, Maryland

The authors describe a procedure for calculating the reagent acid requirements for superphosphate production based on the lime-phosphate ratio of phosphate rock after correcting for fluorine combined as calcium fluosilicate.

FACTORS THAT AFFECT the conversion of rock phosphate to available forms are the composition of the rock, the fineness of grinding, the temperature and concentration of the reagent acid, the intimacy of mixing the rock and acid, and the time allowed for the reaction to occur.

The temperature and concentration of the solution affect the hydrates of the products of reaction, notably calcium sulfate and phosphate, and thereby the distribution of the reactants and products in the solid, liquid, and gas phases. Atmospheric conditions of temperature, relative humidity, and wind velocity affect the drying rate in the curing pile and thereby the extent of the reaction. To these, may be added the idiosyncrasies of plant equipment and the predilections of personnel. All of these factors vary from time to time and from place to place. Consequently, methods of computing reagent acid requirements in superphosphate manufacture have never been standardized.

About 95 per cent of the cost of producing ordinary superphosphate is incurred before the phosphate rock and sulfuric acid are mixed. Of this amount about 55 per cent represents the cost of rock, including grinding, and 40 per cent, the cost of reagent acid (9). These figures emphasize the importance of practicing economy in the use of these materials (7). Since the marketable product is agronomically available phosphate, the proper basis for estimating the cost as well as sale price is the unit of available phosphoric oxide.

PROCESS CONTROL

Control of plant operation generally is based on analyses of green superphosphate. Samples collected during mixing operations in the afternoon are analyzed the next morning and adjustments are made in the proportioning of rock and acid to maintain the desired ratio of free acid to citrate-insoluble phosphate. By layering the product on the curing pile, variations due to the delay in making the adjustments are minimized.

This procedure, while adequate and logical to correct for minor varations in reagent acid concentra-

ITACID REQUIREMENTS

tePRODUCTION

tions and rock composition, does not furnish information on the relative merits of different grades of rock from various sources that would enable the manufacturer to estimate acid requirements prior to purchase of the raw material. Calculations of this sort may be made from a knowledge of the lime-phosphate and fluorine-phosphate ratio of the rock.

METHODS OF COMPUTING ACID REQUIREMENTS

The quantity of reagent acid required per unit of phosphate rock has been computed heretofore on the basis of postulated reactions between the acid and various hypothetical components of the rock, including fluorapatite considered as a mixture of tricalcium phosphate and calcium fluoride, calcium carbonate, and iron and aluminum phosphates. Waggaman and Sauchelli (*9*) illustrate the procedure by citing the analysis of an average grade sample of Florida land pebble phosphate rock, the constituents of which are arbitrarily combined as shown in Table I. The acid requirement of each component is separately listed in Column 3. The requirement listed for calcium fluoride is the amount of sulfuric acid needed to displace all of the fluorine. But only a fraction of the fluorine is volatilized during the acidulation of the rock so that credit may be taken for the acid equivalent of the fluorine retained in the superphosphate.

After discussing the postulated reactions, Waggaman and Sauchelli (*9*) make the following observation concerning the estimation of acid requirements in superphosphate manufacture.

"While the quantity . . . of sulfuric acid which should be used in treating phosphate rock to obtain superphosphate . . . cannot be determined absolutely from the chemical composition of phosphate rock, nevertheless, a close approximation may be made from the analysis of the phosphate which is to be acidulated . . . The best temperature, concentration, and quantity of acid to employ is more or less a separate problem for each individual plant and trial mixes are often necessary to finally establish these points."

From this observation it is evident that experience and plant process control as indicated above are the

Table 1. Acid Requirement of an Average Grade of Florida Land Pebble Phosphate Rock[1] Data by Waggaman and Sauchell (9)

Component	Wt. %	Lbs of H_2SO_4/100 lbs. of Rock
$Ca_3P_2O_8$	67.4	42.6
CaF_2	7.2	9.0
$CaCO_3$	7.7	7.5
RPO_4	7.7	8.6
SiO_2	10.0	—
Total	100.0	67.7

[1] 46.7% CaO, 33.0% P_2O_5, 3.4% CO_2, 3.5% F, 1.5% Fe_2O_3, 2.0% Al_2O_3, and 10.0% SiO_2.

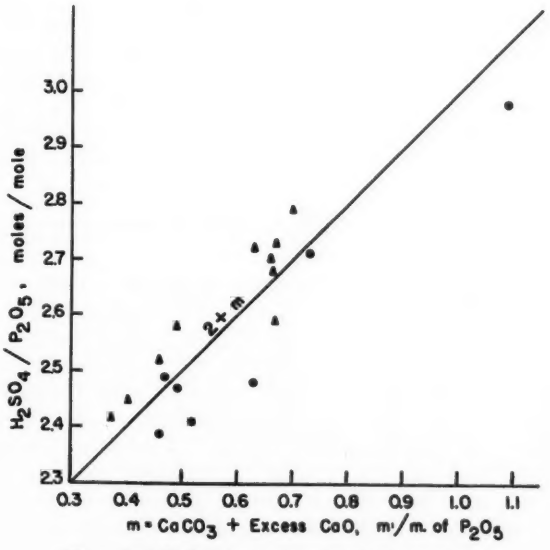


Figure 1. Acid Requirements of Florida Land Pebble Phosphate Rock = 2 + m (Eq. 4)

▲ Calculated by Nomograph Method from data by Jacob, *et al* (5)

• Commercial Acidulations calculated from data by Harvey and Frear (4)

chief guiding principles in superphosphate manufacture. On the basis of such experience, Shoeld, Wight, and Sauchelli (*7*) constructed a set of nomographs in which the phosphate conversion and acid consumption are correlated with the P_2O_5 and CO_2 contents of various grades of Florida land pebble phosphate rock. More recently, Talmai, Herman, Harel, and Peskin (*8*) describe adjustments necessary for the application of these procedures to the determination of acid requirements of North African phosphate rocks. In this article, a comparison will be made of the results computed by a new and novel method described by Fox and Hill (*1*) with the results obtained by previously existing methods.

THEORETICAL CONSIDERATIONS

Heretofore, it has been assumed that the silicon tetrafluoride gas evolved during the acidulation of phosphate rock resulted from a secondary reaction between silica and hydrofluoric acid produced by the reaction of sulfuric acid with fluorapatite (*7*, *9*). It was also assumed that the fluorine thus evolved must be replaced with an equivalent amount of sulfuric acid, as indicated by the data of Table I.

Fox and Hill (*1*) demonstrated that only fluorine combined as fluosilicate reacts to yield fluosilicic acid in solution as a product of the *primary* reaction between phosphate rock and sulfuric acid. The evolution of silicon tetrafluoride gas results from dissociation of the fluosilicic acid in accordance with the following equilibrium equations,

$$\underset{(l)}{2H_2SiF_6.6H_2O} \rightleftarrows \underset{(l)}{H_4SiF_8.12H_2O} + \underset{(g)}{SiF_4} \qquad (1)$$

$$\text{or } \underset{(l)}{H_2SiF_6} \rightleftarrows \underset{(l)}{H_2F_2} + \underset{(g)}{SiF_4} \qquad (2)$$

In dilute acid solutions, the products are fully hydrated and little, if any, fluorine is evolved as gas, but as the concentration of acid increases the equilibrium represented by Equation 1 is shifted toward the right. The transition from higher to lower hydrates of calcium sulfate limit the evolution of fluorine from acid media ordinarily used in superphosphate manufacture to about one-third of the total as shown in Equation 1. But in more concentrated acid media yielding anhydrous salts equilibrium Equation 2 is applicable. In either case the hydrogen equivalent of the residual acid is equal to that of the original fluosilicic acid. Consequently, the evolution of silicon tetrafluoride gas does not constitute a loss of acidity from the rock-acid mixture. Wherefore, the reagent acid requirement of the rock is reduced by an amount equal to the fluosilicate content of the rock, but is not affected by the evolution of silicon tetrafluoride gas during acidulation (*1*, *8*). These findings are expressed in the form of a general equation as follows:—

$$\underset{(s)}{Ca_3P_2O_8.mCaCO_3.nCaSiF_6} + (2+m)\underset{(l)}{H_2SO_4} + (1-m)\underset{(l)}{H_2O} \rightarrow$$

$$(2+m)\underset{(s)}{CaSO_4} + \underset{(s)}{CaH_4P_2O_8.H_2O} + n[(1-a)\underset{(s)}{CaSiF_6} + a\underset{(s)}{CaF2}] + \underset{(g)}{mCO_2} + \underset{(g)}{naSiF_4} \qquad (3)$$

where $(m+n)$ represents moles of calcium in excess, and n, moles of fluosilicate per mole of tricalcium phosphate in the rock and a, the fraction of fluosilicic acid dissociated in accorance with Equations 1 and 2. Let r represent the CaO/P_2O_5 mole ratio of the rock. The acid requirement may than be expressed more simply as

$$H_2SO_4/P_2O_5 = r - 1 - n = 2 + m./m. \qquad (4)$$

COMPARISON OF METHODS

The analyses of the raw materials and final products on which Shoeld, Wight, and Sauchelli (*7*) based their nomographic procedure are not reported. Consequently, it is not possibe to apply their data to either the Waggaman-Sauchelli (*9*) or the Fox-Hill (*1*) procedure. But available analytical data on rocks of the same type may be applied to all three procedures and the results compared. Thus, in the case of the average grade of Florida land pebble phosphate rock cited by Waggaman and Sauchelli (*9*) (Footnote 1,

Table II. Acid Requirements of Florida Land Pebble Phosphate Data by Jacob, et al (5)

Sample No.	Location of Deposit	Moles/mole of $Ca_3P_2O_8$			H_2SO_4/P_2O_5, m/m		S-W-S F-H %
		$CaSiF_6$[1] = N	$CaCO_3$[2]	Ex.CaO[3]	S-W-S[4]	F-H[5] = 2 + M	
			Series (a), $CaCO_3$ = M-0.235[6]				
912	Mulberry	0.14	0.14	0.23	2.42	2.37	102.1
898	Lakeland	.14	.16	.24	2.45	2.40	104.2
439	Mulberry	14	.26	.23	2.58	2.49	103.6
622	Nichols	.15	.26	.93	2.58	2.49	103.6
910	Mulberry	.16	.39	.24	2.72	2.63	103.4
619	Nichols	.16	.46	.24	2.79	2.70	103.3
			Series (b), $CaCO_3$ = M-0.283[6]				
627	Lakeland	.14	.18	.28	2.52	2.46	102.4
790	Not known	.16	.37	.29	2.68	2.66	100.8
947	Brewster	.16	.38	.28	2.70	2.66	101.5
618	Pierce	.16	.39	.28	2.73	2.67	102.2
			Series (c), $CaCO_3$ = M-0.45[6]				
617	Brewster	.16	.22	.45	2.59	2.67	97.0

[1] Equivalent of fluorine.
[2] Equivalent of carbon dioxide.
[3] Calcium in excess of $Ca_3P_2O_8 + CaSiF_6 + CaCO_3$
[4] Shoeld-Wight-Sauchelli nomographic method of computing.
[5] Fox-Hill method of computing (Eq. 4).
[6] M = r — (3 + n) = $CaCO_3$ + Ex. CaO.

Table 1), computation by the Fox-Hill method would be,
r = 46.7x142/33.0x56.08 = 3.58
n = 3.5x142/33.0x114 = 0.13 and
2+m = r-1-n = 3.58–1.13 = 2.45 moles of H_2SO_4 per mole of P_2O_4 in the rock.

According to the nomographic procedure of Shoeld, Wight, and Sauchelli (*7*), the same rock containing 33 per cent P_2O_5 and 3.4 per cent CO_2 would require 1165 pounds of 50° Be (62.2 per cent) sulfuric acid per 1200 pounds of rock to produce one ton (2,000 lbs.) of 20 per cent superphosphate. This is equivalent to 2.61 moles of H_2SO_4 per mole of P_2O_5, compared with 67.7–6.0 = 61.7 pounds of H_2SO_4 per 100 pounds of rock (Table 1), equivalent to 2.67 moles of H_2SO_4 per mole of P_2O_5 computed by the Waggaman-Sauchelli (*9*) method after deducting the acid equivalent of fluorine retained in the superphosphate (*8*).

On the basis of the above estimates, it appears that 100(2.67–2.45)/2.45 = 9.0 per cent more acid is required according to the Waggaman-Sauchelli (*9*) method, than was found by the Fox-Hill (*1*) method. This conclusion is supported by results obtained in plant practice, where even greater economies in acid consumption have been reported without apparent loss due to incomplete conversion of rock phosphate to available forms.

It is not possible to obtain a proper balance between the basic and acidic constituents of phosphate rock by considering fluorine as fluoride (*5*). This is illustrated by the fact that the combined equivalents of the carbon dioxide and fluoride contents of the average grade of pebble rock cited above are equal to 0.699 moles of calcium compared with only 0.583 moles of calcium in excess of tricalcium phosphate. Deducting phosphate equivalent to the iron and aluminum does not greatly improve the material balance and, since there is no mathematical formula for doing so, an arbitrary distribution of the constituents among the several components must still be made.

The compositions of different grades of Florida land pebble phosphate rock expressed as moles of calcium fluosilicate, calcium carbonate, and calcium oxide otherwise combined per mole of tricalcium phosphate calculated from data by Jacob, *et al* (*5*), are shown in Table II. The calcium in excess of the phosphate, fluosilicate, and carbonate (Col. 5) presumably is combined as silicate and/or organic salts (*3*, *9*) and represents the proportion of the parent limestone from which the carbonate ion has been displaced by anions other than phosphate and fluosilicate. In the acidulation, these anions in turn would be displaced along with the carbonate by sulfate ions. Accordingly, in Equations 3 and 4 the quantity *m* includes both the residual carbonate (Col. 4) and excess calcium (Col. 5, Table II).

The data of Table II fall into two distinct series (*a* and *b*) with one sample that does not fall into either of these two and, presumably, is representative of a third (c) series that differ in the amount of calcium in excess of the phosphate, fluosilicate and carbonate. Presumably, such differences pertain to different strata, geological age, or other circumstances that have produced these results. The difference in excess Calcium (Col. 5) between the *a* and *b* Series is small, compared with the magnitude of variations in the carbonate content (Col. 4). Consequently, there should be a fairly close correlation between the acid requirements and the carbonate contents of these rocks as found by Shoeld, Wight, and Sauchelli (*7*). Computations by their nomograph method (Col. 6) are based on 97 per cent conversion in 30 days (considered by the authors to be the most economical rock-acid ratio). The acid requirements of these rocks, computed in accordance with Equations 3 and 4, are shown in Column 7, Table II.
Comparing these data (Col. 8), it will be observed that the acid requirements determined by the nomograph method slightly exceed those computed by means of Equation 4 in all cases except the one sample (No. 617) in the *c* series. The averages by the two procedures, exclusive of this one sample, are 2.62 and 2.55 moles of H_2SO_4 per mole of P_2O_4, respectively, or 2.5 per cent more acid by the nomograph method. This slight difference in the *a* and *b* series is offset to some extent by 3 per cent less acid in case of the one sample in the *c* series.

The slight positive difference in the *a* and *b* series may be partly attributable to differences in conditions under which the superphosphates were prepared. In the laboratory preparations the superphosphates were air-dried to constant weight while most 30-day old commercial superphosphates still retain 6–8 per cent of free moisture. The low acid estimate obtained by the nomograph method in the *c* series rock is undoubtedly due to its unusually high carbon dioxide replacement by other anions.

The lime-phosphate ratios of seven commercial superphosphates made from Florida land pebble phosphate rock and one from Tennessee brown rock, calculated from data by Harvey and Frear (*4*), are listed in Table III, Column 2. Correcting these ratios by n, the average of the observed fluosilicate-phosphate ratios (Col. 3, Tables II and IV), the acid requirements, 2+m (Eq. 4), were obtained as shown in Column 3, Table III. The moles of H_2SO_4 used (Col. 4), calculated from the SO_3 and P_2O_5 contents, were divided by the theoretical (2+m) acid requirements to obtain the degree of acidulation shown in

Table III. Composition of Commercial Superphosphates Calculated from data by Harvey and Frear (4)

Sample No.	CaO/P_2O_5 M/M	2 + M[1] M/M	SO_3/P_2O_5 M/M	Acidulation[2] %	Available P_2O_5 % of Total
1	3.62	2.47	2.49	100.8	98.0
2	4.24	3.09	2.98	96.4	98.9
3	3.73	2.58	2.48	96.1	98.6
4	3.61	2.46	2.39	97.2	97.9
5	3.88	2.73	2.71	99.3	97.5
6	3.67	2.52	2.41	95.6	99.4
7[3]	3.61	2.47	2.74	110.9	97.6
8	3.64	2.49	2.47	99.2	98.1
Average	**3.75**	**2.60**	**2.58**	**99.4**	**98.3**

[1] CaO/P_2O_5-1-N, where N = 0.15 (Table II).
[2] $100(SO_3/P_2O_5)/(2 + M)$.
[3] This samples appears to have been made with Tennessee brown rock, the others with Florida land pebble.

Table IV. Acid Requirements of Various Domestic Phosphates Data by Jacob, et al (5)

Sample No.	Location of Deposit	Moles/mole of $Ca_3P_2O_8$			H_2SO_4/P_2O_5, m/m		S-W-S F-H
		$CaSiF_6$[1] =N	$CaCO_3$[2]	Ex. CaO[3]	S-W-S	F-H	%
			Florida, hard and soft rock				
728	Juliette	0.13	0.19	0.02	2.52	2.21	114.0
771	Not known	.13	.25	.07	2.57	2.32	110.8
443	Gilchrist Co.	.14	.25	.12	2.56	2.37	108.0
434	Dunnellon	.13	.15	.22	2.56	2.47	103.6
932	Dunnellon	.13	.20	.26	2.51	2.46	102.0
589	Floral City	.14	.17	.29	2.50	2.46	101.6
			Tennessee Rock				
1031	Godwin	.13	.28	.19	2.57	2.47	104.0
1048	Tomscreek	.13	.25	.22	2.61	2.57	101.6
564	Wales	.14	.11	.26	2.42	2.37	102.1
906	Wales	.14	.12	.26	2.42	2.38	101.7
587	Wales	13	11	.29	2.31	2.40	96.3
762	Mountpleasant	.14	.16	.28	2.45	2.44	100.4
908	Mountpleasant	.14	.18	.30	2.49	2.48	100.4
56	Not known	.14	.20	.33	2.50	2.53	98.8
1049	Boma	.13	.09	.32	2.43	2.41	100.8
448	Glover	.14	.15	.34	2.47	2.49	99.2
772	Glover	.14	.21	.39	2.55	2.60	98.1
449	Gordonsburg	.15	.20	.33	2.51	2.53	99.2
930	Gordonsburg	15	.27	.33	2.62	2.60	100.8
			South Carolina Rock				
1138	Charleston	.17	.59	.34	—	2.93	—
1139	John's Island	.17	.61	.32	—	2.93	—
			Western Phosphates				
550	Paris, Idaho	.13	.18	.27	2.50	2.45	102.0
973	Conda, Idaho	.13	.17	.31	2.54	2.48	102.4
454	Conda, Idaho	.13	.18	.32	2.53	2.50	101.2
948	Cokesville, Wyo.	.15	.44	.30	2.76	2.74	100.7
1010	Garrison, Mont.	.13	.10	.29	—	2.39	—
1009	Garrison, Mont.	.13	.10	.32	2.44	2.42	100.8
1011	Garrison, Mont.[4]	.13	.09	.33	—	2.42	—

[1] Equivalent of fluorine.
[2] Equivalent of carbon dioxide
[3] Equivalent of calcium in excess of $Ca_3P_2O_8 + CaSiF_6 + CaCO_3$.
[4] Fluorine identified in this sample, assumed to be equivalent to 0.54 moles of CaF_2 per mole of $Ca_3P_2O_8$ (Table IV).

Column 5. The available phosphate, expressed as percentage of the total, is shown in Column 6. Exclusive of No. 7 made from Tennessee rock, the acidulations averaged 97.8 per cent and the available phosphates, 98.3 per cent in the Florida rock superphosphates.

A correlation of the acid requirements of Florida land pebble phosphate rock calculated by the nomograph method (Col. 6, Table II) and the commercial acidulation (Col. 4, Table III, No. 7 excluded) with the theoretical (2+m) according to Equation 4, is shown in Figure I.

In Table IV, results obtained by applying the nomograph method to the analyses of various other domestic rocks are compared with the theoretical acid requirements of these rocks according to Equation 4. Of the six samples of Florida rock listed in this table, two (Nos. 728 and 443) were soft rock, both of which gave high estimates by the nomograph method compared with the theoretical according to Equation 4. Of the other four hard rock samples, only one, the origin of which is not known, gave high results comparable with the soft rocks. The other three gave estimates by the two methods that are comparable with the results for the land pebble phosphate shown in Table II. It will be observed that the Florida rocks listed in Table IV showed relatively narrow limits of variation for calcium carbonate, and relatively wide limits for excess calcium oxide-tricalcium phosphate ratios, which is just the reverse of the land pebble phosphates (Table II).

The acid requirements of the Tennessee and Western phosphates calculated by the two procedures gave correlations equally as good, if not better, than the pebble rock. The analyses of two samples of South Carolina rock (Nos. 1138 and 1139), and two from Garrison, Montana, (Nos. 1010 and 1011) did not fall within a reasonable range of extrapolation of the nomograph. Consequently, estimates of their acid requirements could not be made by this procedure. Estimates made by the use of Equation 4 (Col. 7) show relatively high acid requirements for South Carolina rock, but not exceeding some Florida land pebble rocks (No. 2, Table III).

Of the three samples of rock from the Garrison deposit, one (No. 1010) was a high grade (82 per cent B.P.L.) rock, the other two (Nos. 1009 and 1011) were low grade (68 per cent and 60 per cent B.P.L., respectively). When calculated on the mole ratio basis as shown in Table IV, two (Nos. 1009 and 1010) showed the same fluosilicate-phosphate, and carbonate-phosphate ratios; the other (No. 1011) had an unusually high fluorine-phosphorus ratio and a correspondingly high calcium-phosphate ratio that distinguishes it from the other two samples from the same locality. By reference to Footnote 4, it will be seen that sample No. 1011 is the only one in which fluorite was found by petrographic examination.

If it be assumed that the presence of calcium fluoride in this sample is due to an abnormal condition peculiar

Table V. Composition of Phosphate Rocks from Garrison, Montana Data by Jacob, et al (5)

Sample No.	1009		1010		1011	
Constituent	G.m./Kg.	Wt.%	G.m./Kg.	Wt.%	G.m./Kg.	Wt.%
$Ca_3P_2O_8$	2.21	68.6	2.64	81.9	1.95	60.4
$CaSiF_6$	0.28	5.1	0.34	6.1	0.25	4.6
CaF_2[1]	—	—	—	—	1.05	8.2
$CaCO_3$	2.23	2.3	0 27	2.7	0.17	1.7
CaO, excess	0.66	3.7	0.76	4.2	0.65	3.6
SiO_2	2.53	15.2	0.73	4.4	2.88	17.3
Organic Matter	—	1.3	—	0.7	—	1.4
Other (by difference)	—	3.8	—	0.0	—	2.8

[1] Identified by petrographic means in No. 1011, only.

Table VI. Acid Requirements of Phosphate Rock from Various World Sources Data by Jacob et al (5)

Sample No.	Location of Deposit	Moles/mole of $Ca_3P_2O_8$			H_2SO_4/P_2O_5 M/M
		$CaSiF_6$	$CaCO_3$	Ex. CaO	
	Insular Deposits				
943	Curacao Is.	0.012	0.217[1]	0.0	2.07
985	Curacao Is.	.022	.326[1]	.040	2.26
452	Christmas Is.	.042	.186	.141	2.33
450	Nauru Is.	.084	.169	.295	2.46
451	Ocean Is.	.094	.085	.220	2.31
	Crystalline Apatites				
905	Quebec	.101	.121	.070	2.19
2212	Kola Peninsula[2]	.101	—	.508	2.41
1136	Virginia	.075	—	.697	2.70
	North African Deposits				
1162	Morocco	.150	.378	.294	2.67
552	Tunis	.157	.698[1]	.425	3.12

[1] Including $MgCO_3$.
[2] Data by Fox and Hill (1)

to the immediate vicinity of the site in which it was found, the compositions of the three samples may be reconciled on the bases of an equal fluosilicate-phosphate ratio with the excess calcium and fluorine in sample No. 1011 combined as calcium fluoride. This reconciliation is shown in Table V.

The acid requirements of these rocks, despite the differences in composition (Table V), when corrected for the combined fluoride and fluosilicate contents, are substantially the same as that calculated by the nomograph method for No. 1009 (Table IV).

ACID REQUIREMENTS REDUCED BY RECYCLED FLUORINE

Silicon tetrafluoride gas evolved during acidulation in accordance with Equation 1 may be absorbed in water to reform fluosilicic acid, as follows:

$$3SiF_4 + 4H_2O \rightarrow 2H_2SiF_6 + Si(OH)_4 \qquad (5)$$
$$(g) \quad (l) \quad (l) \quad (s)$$

The fluosilicic acid solution thus formed may be recycled to the rock-acid mixture as make-up water for sulfuric acid. This means of disposing of troublesome fluorine-bearing liquors is practiced by one or more companies located in areas where such liquors may not be disposed of in the usual manner. In this case, the requirement for reagent acid may be further reduced by an amount equal to the recycled fluosilic acid.

ACID REQUIREMENTS OF FOREIGN ROCKS

The compositions of phosphate rocks from some of the more important insular deposits and North Africa, together with their estimated acid requirements in accordance with Equation 4, are compared with similar data for crystalline apatites from three different sources in Table VI. The data for the insular deposits, arranged in the order of increasing fluosilicate replacement of carbon dioxide (Col. 3) show a corresponding increase in CO_2 replacement by anions other than phosphate or fluosilicate (Col. 5) with a decreasing residue of carbonate (Col. 4) per mole of tricalcium phosphate. These data show that phosphate and fluosilicate are separately deposited in phosphate rock. If the fluosilicate-phosphate ratio (Col. 3) is a measure of the relative age of the deposits (*5*), it would appear that the North African deposits are much older than the crystalline apatites.

On the other hand, the crystalline apatites, except for their crystals habit and carbonate contents, do not appear to be greatly different from other phosphate rocks. Apatite No. 2212 from the Kola Peninsula, USSR, was one of the materials used in studying factors affecting fluorine volatilization during phosphate rock acidulation (*1*). The influences of acid concentration and temperature on fluorine volatilization were substantially the same for it as for Florida land pebble rock. The carbonate appears to have been more or less completely replaced by other anions in the Kola and Virginia apatites, but only partly replaced in the Canadian apatite.

In the light of these observations it appears that the crystalline apatites are end-products of the metamorphic process by which coral limestone is converted into phosphate rock, rather than parent materials. In any event, the acid requirements of these apatites, computed on the basis of reaction Equation 3, vary as widely as those of other types of phosphate rock.

THE INFLUENCE OF ROCK IMPURITIES ON ACID REQUIREMENTS

Purely physical impurities, such as quartz sand, merely reduce the grade of the rock without affecting the acid requirement per unit of phosphate in the rock. By removing them the grade of the rock may be increased and thereby change the rock-acid ratio on a weight basis without changing it on the mole basis.

Chemical impurities, on the other hand, are reactive toward the reagent acid and tend to increase the acid consumption without increasing the available phosphate production. Included in this category are the residue of unreacted parent limestone, and the limestone from which carbon dioxide has been displaced by anions other than phosphate, such as silicate, fluoride, fluosilicate, and organic acid radicles. Of these, only the fluosilicate and/or fluoride ions are strong enough to compete with the phosphate in the secondary reaction. The others, including the carbonate, are all permanently displaced by sulfate in the primary reaction.

There is also a third class of materials intermediate between the highly reactive calcareous salts and the inert physical impurities. These are derived from the constituents of ordinary soil, such as clay, that react with soluble phosphate leached from bird guano (*5*)

to produce the clay, or waste-pond phosphate, a common constituent of phosphate rock.

The composition of this material may vary widely, ranging up to 1.25 per cent F, 18 per cent SiO_2, and 25 per cent P_2O_5 in combination with 9 per cent CaO and 29 per cent Al_2O_3 to form highly complex salts that are relatively inert (*3*). The ratio of CaO to P_2O_5 in this material is substantially the same as in monocalcium phosphate so that correction for it does not materially affect the acid requirements as calculated by means of Equation 4. On the other hand, there are two moles of aluminum and iron oxides per mole of phosphoric oxide, requiring six moles of sulfuric acid, instead of two per mole of tricalcium phosphate. Consequently, the phosphate combined with the clay is scarcely worth the reagent acid required to make it available. This conclusion is emphasized by the fact that the phosphate made available from this type of material tends to revert to unavailable form upon ammoniation (*4*).

The replacement of carbonate by silicic, or organic acid ions affects the results of calculations for acid requirements by the nomograph method of Shoeld, Wight, and Sauchelli (*7*), but has no effect on the calculation according to Equation 4. The replacement of carbonate by fluosilicate and/or fluoride, on the other hand, affects both methods of computation, but not in the same way. Phosphorus combined as clay phosphate does not affect the calculation of acid requirement according to Equation 4, but affects the conversion of the phosphate to available form. This is illustrated by superphosphate No. 7, Table III, made from Tennessee brown rock. The RPO_4 equivalent of the iron and aluminum oxides in this sample amounted to 6.4 per cent, compared with an average of only 2.9 per cent in the superphosphates made from Florida rock. The average acidulation of the latter (exclusive of No. 7) is only 97.8 per cent, compared with 110.9 per cent for the Tennessee rock, while the available phosphate of No. 7 was only 97.6 per cent, compared with an average of 98.4 per cent for the Florida rock superphosphates. The differences in these data are attributable to the greater clay phosphate content of the Tennessee rock, for which beneficiation by modern ore dressing procedures has not been so highly developed as in the Florida phosphate fields.

REQUISITE ANALYTICAL DATA

The fact that only the P_2O_5 and CO_2 contents are needed to determine the acid requirements of Florida land pebble phosphate rock by the nomographic method of Shoeld, Wight, and Sauchelli (*7*) is misleading, since the nomographs have been developed through the use of a great deal of operational data in practical plant experience. Without such a background of experience, the method could not have been developed. It cannot be applied to rock of a different type with any degree of assurance since there is no theoretical basis on which such an application may be made. Such correlations as have been observed in this study are due to a common genesis of phosphate rock in the several locations in which it is found.

The procedure of Fox and Hill (*1*) is based on a sound theoretical concept concerning the nature and behavior of fluorine compounds in phosphate rock and their effect on the acid requirements calculated on the basis of the lime-phosphate ratio of the rock. For rocks for which the fluorine-phosphate ratio is known, only the CaO and P_2O_5 contents are needed, but for rock of unknown fluorine content, the latter is also needed.

Phosphate rock is graded for the market on the basis of its P_2O_5 content considered as tricalcium phosphate, or bone phosphate of lime (BPL). Actually, the true market value is determined not only by its phosphate, but its calcium and fluorine contents as well, since the latter determine how much reagent acid is needed to convert the phosphate to available form. The analyses for these constituents could be made a part of the rock specifications without difficulty since the producers are equipped to supply this information. To illustrate the importance of this aspect of the problem, consider the difference in acid requirements of two samples of rock (Nos. 910 and 912, Table II) from the same deposit near Mulberry, Florida, amounting to 100 (2.63–2.37)/2.37 = 12.7 per cent equivalent to about 5 per cent of the total cost of producing ordinary superphosphate, according to the estimates of Waggaman and Sauchelli (*9*). At current (1959) prices this would amount to about 90¢ per ton of ordinary superphosphate.

SUMMARY

A procedure is described for calculating the reagent acid requirements for superphosphate production based on the lime-phosphate ratio of phosphate rock after correcting for fluorine combined as calcium fluosilicate. A new concept for the theoretical aspects of the procedure based on experimental evidence is discussed. Results obtained by its use compare favorably with results computed by the Shoeld-Wight-Sauchelli (*7*) nomograph method and has the advantage of being applicable to different types of rock from various sources.

The CaO and P_2O_5 contents of phosphate rocks are required information. The known F/P ratios of rocks from the older continental deposits may be used to calculate the fluosilicate-phosphate ratio, but fluorine would have to be determined in samples from unknown sources.

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Alphabetical List of Advertisers

EDITORIAL

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The business of stressing BASICS

In some respects the "total marketing concept" is so "new" that we find ourselves being more BASIC than we wish to be. On the other hand, at times it seems like "carrying coals to Newcastle" to talk marketing to old pros who have been selling for more years than they can remember.

But all we have to do to get back on the "right thinking track" is to go all the way to the *top level* of management in companies that have distinguished themselves. There at the "summit" we find that *in this business of marketing it's impossible to get BASIC enough!*

Kind of reminds us of what Wroe Alderson, one of the leading marketing people in the country, once wrote:

"It is necessary to be more *theoretical* in marketing in order to be more *practical*."

(You'll recall that it was Alderson & Associates, Inc., Philadelphia, who helped us launch our new Marketing Approach with Theodore Nowak's "foundation article"—"Keystone to Future Profits"—back in January.)

Actually, we don't claim to be marketing experts at all. That's the reason we're asking leading marketing experts to help us hold the first Farm Chemicals Marketing Seminar (FCMS) this month (November 16–17).

But this editorial is not about FCMS, but rather the importance of being BASIC.

A good example is advertising. . . .

L. F. Czufin, advertising manager for California Spray Chemical Corporation, was forced to be BASIC in his interesting talk before the NAC convention when he attempted to show the increased sales the pesticide industry could *expect* from extensive advertising. Compared to farm machinery people and other major manufacturing industries attempting to reach farmers, pesticide advertising is almost non-existent! (See his article on page 22 of this issue.)

The farm chemicals industry sells *useful* products. Farmers admit that they're not using half enough fertilizer, for instance. Yet few companies are attempting to make a bold bid for this vast potential market.

Now suppose you were selling *cigarettes*, instead of farm chemicals. As Mr. Alderson points out, ". . . a large part of the price of a package of cigarettes is represented by Federal excise taxes. It is hard to unravel the social consequences of advertising a product of which half is government services, a large part of the remainder television entertainment plus a little smoke and a modicum of human vanity."

He stresses the BASIC fact that advertising helps to *decrease the total cost of selling!* It's no different with cigarettes than with farm chemicals!

"There are two aspects of advertising with quite different economic effects. One creates problem awareness and affects the demand for products which are offered to meet the problem. The other helps to routinize trade contacts and hence to *reduce marketing costs*," Alderson adds.

Robert S. Thompson, president of Thompson-Hayward Chemical Company, hit on a much overlooked BASIC truth in farm chemicals selling in his talk at the NAC convention. He remarked:

"*It has been proven many times that people never buy a product or a service. They always buy what that product or service will do for them. That is, they buy results! What we need then are more salesmen merchandising and selling pesticides who can translate a product feature into a customer benefit or result.*

"BASIC knowledge?" he asks. "Perhaps—yet the truth is that our industry has been plagued by selling practices which emphasized the features of the product or service rather than the results—and often the main feature emphasized was lower price."

FARM CHEMICALS would like to call your attention to an extensive article on the above subject—just in case you didn't read it in our September issue. It was entitled "What's in it for ME?" (Page 26).

One of the most outstanding talks to be presented at FCMS this month will be a basic guide to marketing, by Charles E. St. Thomas of St. Thomas Associates. He will explain "The Modern Marketing Concept and Four Steps to Acceptance of It."

In his talk he calls first for a decision to *really adopt the Concept*. This decision-making must be made by the *top man* in the organization. It should be made *decisively*—then followed through by every person in the organization.

BASIC? You bet it is. But the more basic the farm chemicals industry becomes in this business of marketing, the more successful it will be.

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